REPUBLIC OF INDONESIA
MINISTRY OF PUBLIC WORKS
DIRECTORATE GENERAL OF HIGHWAYS

THE FEASIBILITY STUDY OF THE LOCAL ROAD DEVELOPMENT IN THE REPUBLIC OF INDONESIA

KABUPATEN REPORT 11

KABUPATEN BARITO SELATAN

MARCH 1986

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

This is the Kabupaten Report of the Feasibility Study of the Local Road Development in the Republic of Indonesia for Kabupaten Barito Selatan in Kalimantan Tengah Province. The report has been prepared by the Study Team of the Japan International Cooperation Agency (hereinafter called JICA).

Based upon a request from the Government of Indonesia, the Government of Japan arranged for JICA to conduct the Study and JICA accordingly organized a Study Team. The study was carried out using data which were generally prepared by the Kabupaten, routed through the province, under the instructions of Bina Marga of the Ministry of Public Works and Bangda of the Ministry of Home Affairs.

Since the study period was limited, without cooperation of Bina Marga, Bangda and local governments of both province and Kabupaten in collecting the data, the study would not have been completed within the period.

The report consists of the results of the feasibility study and proposed implementation programme of the local road development in the Kabupaten.

The simplified economic feasibility evaluation methodology utilized for the study was established by the Study Team in Phase I Study through a pilot study of seven (7) model Kabupatens, and is described in the Main Report.

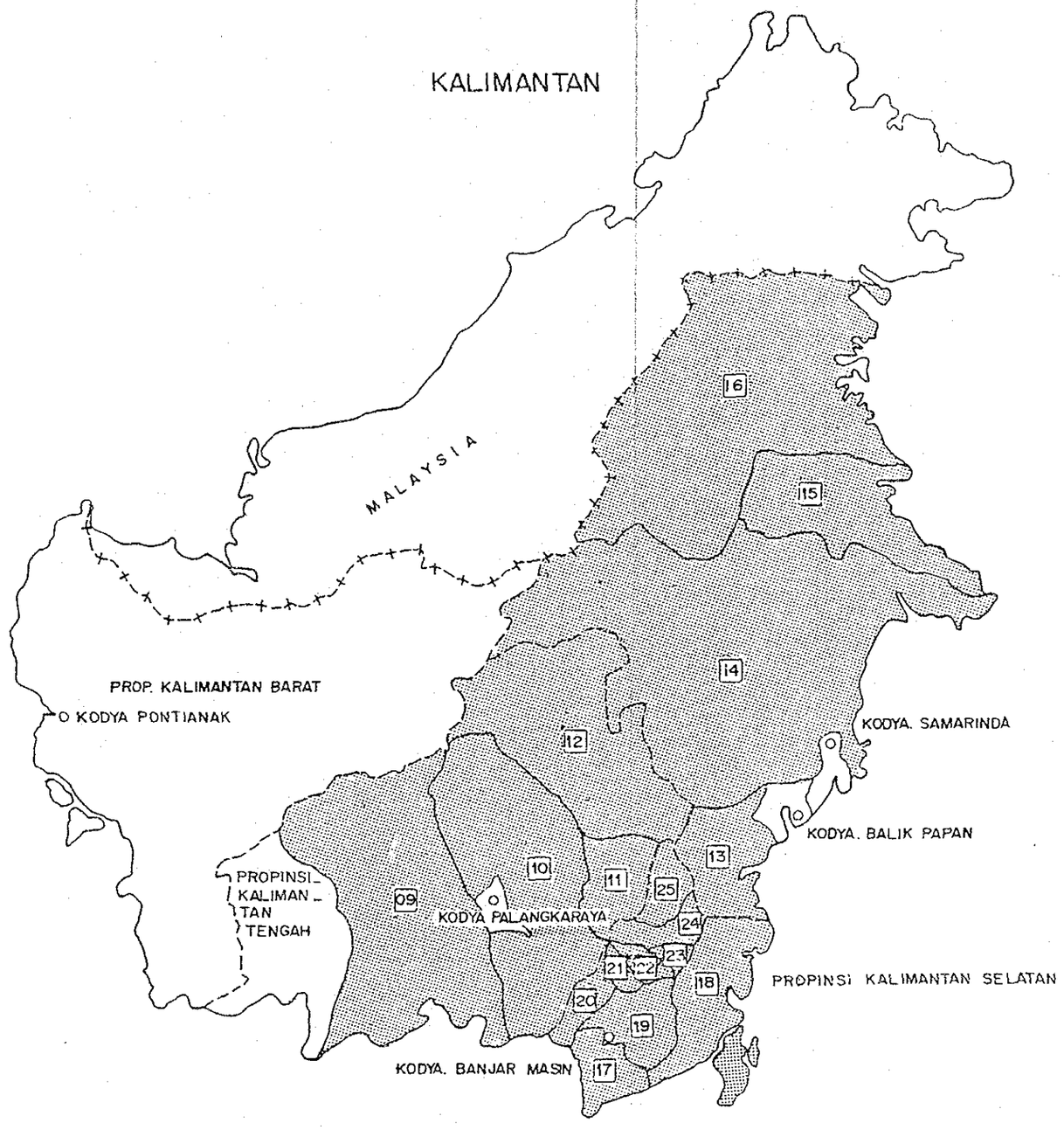
The purpose of the study for the Kabupaten is mainly to estimate the total Project Cost for the local road development but only limited data is available for study base. Therefore a detailed survey and design for the improvement of the Kabupaten roads should be carried out before commencing the Project together with a review of this report.

LOCATION MAP OF THE PROJECT AREAS

IV · PROPINSI KALIMANTAN TENGAH
- 09 · KAB · KOTA WARINGIN TIMUR
- 10 · KAB · KAPUAS
- 11 · KAB · BARITO SELATAN
- 12 · KAB · BARITO UTARA

V · PROPINSI KALIMANTAN TIMUR
- 13 · KAB · PASIR
- 14 · KAB · KUTAI
- 15 · KAB · BERAU
- 16 · KAB · BULUNGAN

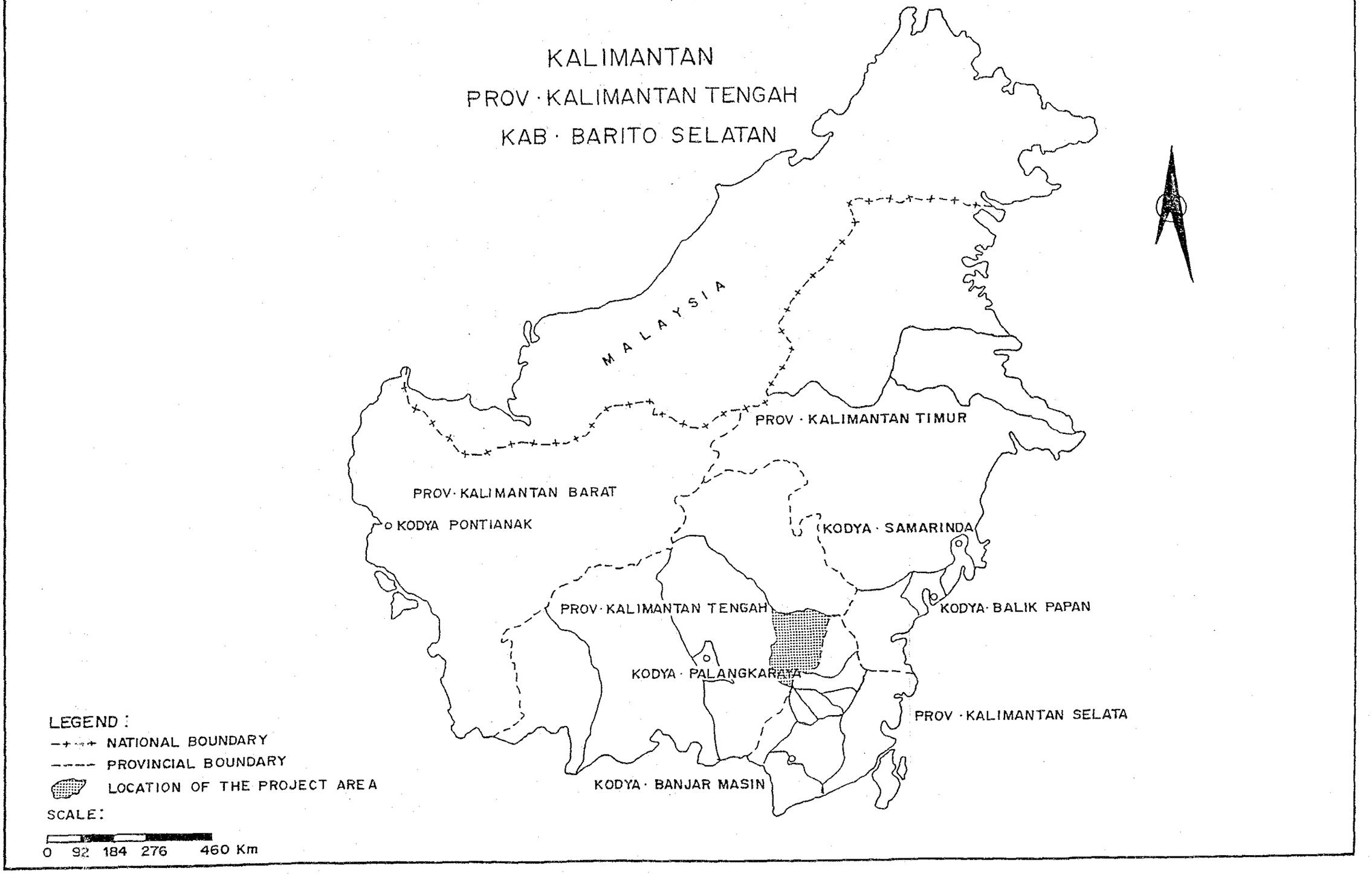
VI · PROPINSI KALIMANTAN SELATAN
- 17 · KAB · TANAH LAUT
- 18 · KAB · KOTA BARU
- 19 · KAB · BANJAR
- 20 · KAB · BARITO KUALA
- 21 · KAB · TAPIN
- 22 · KAB · HULU SUNGAI SELATAN
- 23 · KAB · HULU SUNGAI TENGAH
- 24 · KAB · HULU SUNGAI UTARA
- 25 · KAB · TABALONG



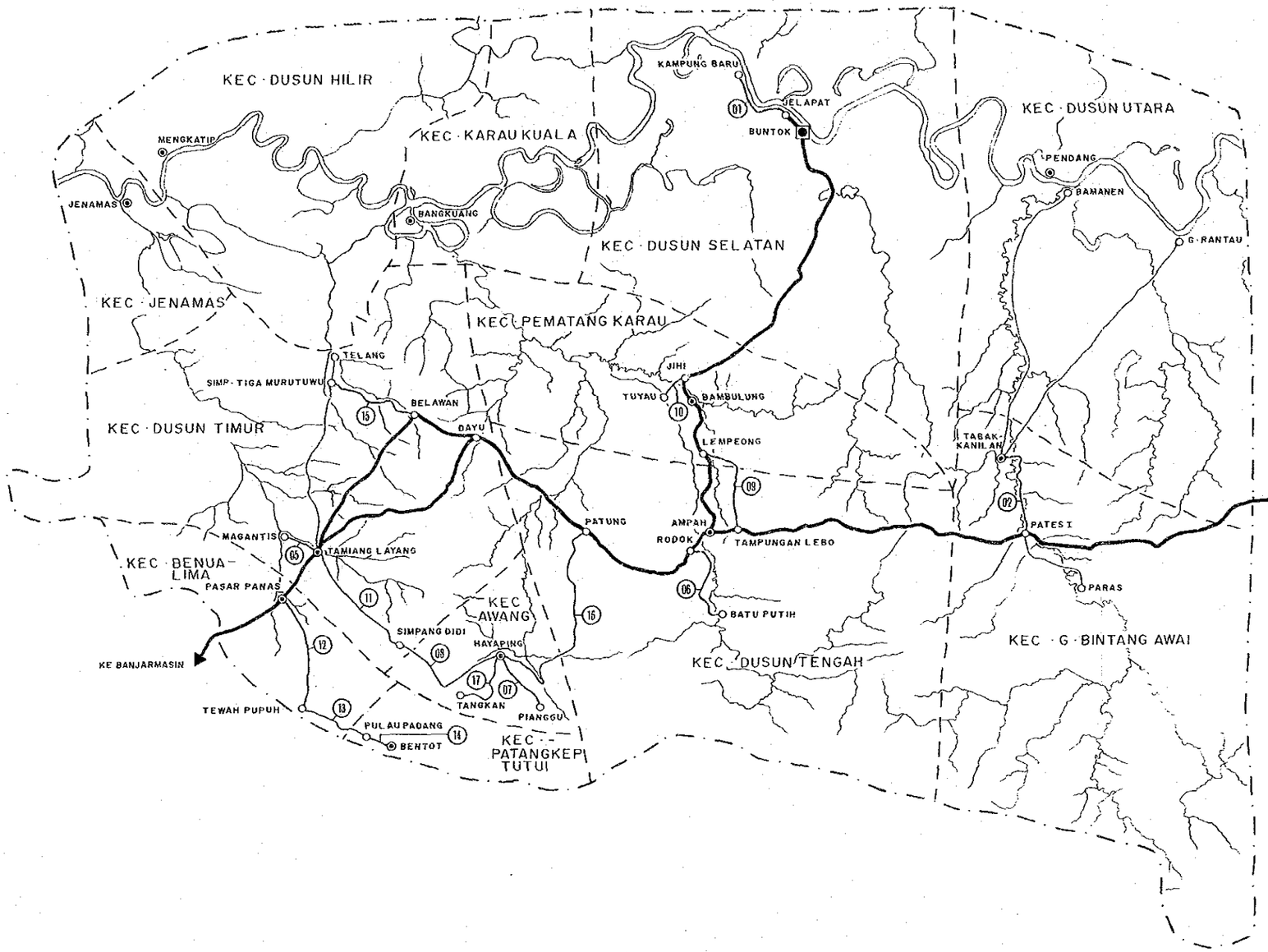
LEGEND :
- −+−+ NATIONAL BOUNDARY
- −−−− PROVINCIAL BOUNDARY
- LOCATION OF THE PROPOSED AREA

SCALE :

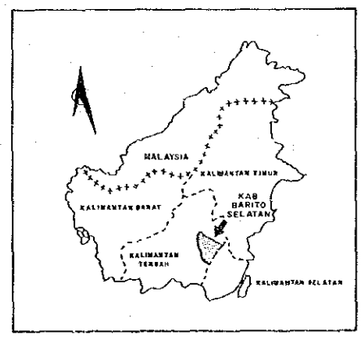
0 92 184 276 460 Km.


KALIMANTAN
PROV · KALIMANTAN TENGAH
KAB · BARITO SELATAN
MALAYSIA
PROV · KALIMANTAN TIMUR
PROV · KALIMANTAN BARAT
KODYA PONTIANAK
KODYA · SAMARINDA
PROV · KALIMANTAN TENGAH
KODYA · BALIK PAPAN
KODYA · PALANGKARAYA
PROV · KALIMANTAN SELATA
KODYA · BANJAR MASIN
LEGEND :
NATIONAL BOUNDARY
PROVINCIAL BOUNDARY
LOCATION OF THE PROJECT AREA
SCALE:
0 92 184 276 460 Km

KAB · BARITO SELATAN



LOCATION MAP



LEGEND :

- KABUPATEN CAPITAL
- KECAMATAN CAPITAL
- OTHER CITY
- LINK NUMBER
- PROVINCIAL BOUNDARY
- KABUPATEN BOUNDARY
- KECAMATAN BOUNDARY
- NATIONAL ROAD
- PROVINCIAL ROAD
- KABUPATEN ROAD
- VILLAGE ROAD
- RIVER

SCALE :

0 5 10 15 Km

THE FEASIBILITY STUDY OF THE LOCAL ROAD DEVELOPMENT IN THE REPUBLIC OF INDONESIA

TITLE :

SOURCE :	SCALE :	PROVINCE :
DIREKTORAT JENDERAL CIPTA KARYA	AS SHOWN	KALIMANTAN TENGAH
		KABUPATEN : BARITO SELATAN

C O N T E N T S

Chapter 1 BACKGROUND OF THE KABUPATEN

1.1 Topographic and Meteorological Conditions

1.1.1 Location and Topography

Kabupaten Barito Selatan is located in the east of Kalimantan Tengah Province. On the est it is bordered by Kabupaten Barito Timur. Kabuapten Barito Timur is a mandatory Kabupaten administered by Kabupaten Barito Selatan, so that the study for these two Kabupatens shall be carried out as one on Kabuapten Barito Selatan.

The Kabupaten lie in the middle region of the Barito River which rises in the northern mountains close to the provincial boundary. They are bordered on the north by Kabupaten Barito Utara and on the west by Kabupaten Kapuas. The eastern region, Kabupaten Barito Timur is located in the flat basin of the Karau River, a branch of the Barito River. The western region, Kabupaten Barito Selatan is almost wholly covered with swamps except for the northern part which is covered with undulating hills. In the junction of the Barito and Karau Rivers natural lakes are formed making the regional feature that of waterscapes.

The total area both the Kabupaten amounts to 12,900 square kilometers, approximately 9 percent of the total of Kalimantan Tengah Provinces. They consists administratively of 12 Kecamatans in all.

1.1.2 Meteorological Conditions

The average number of rainy days and the average amount of yearly rainfall in Kabupaten Barito Selatan are 102 days and 3,089 mm respectively.

One year in the Kabupaten consists of a rainy season and a dry season. The dry season is from May through October in general. However this is variable as Table 1-1-1 shows.

The number of working days which is necessary for planning the construction schedule in chapter 6, is estimated at 250 days using the following formula based upon the data shown in the table referred to above.

$$\text{Working Days} = 365 - \text{Holidays} - \text{Rainy Days} + \left(\text{Rainy Days} \times \frac{\text{Holiday}}{365}\right) + (0.10 \times \text{Rainy Days})$$

Where :

- Holidays consist of 52 Sundays and 13 national holidays; and
- 10% of rainy days are assumed to be workable days.

Table 1-1-1

METEOROLOGICAL CONDITIONS

PROVINCE : Kalimantan Tengah
KABUPATEN : Barito Selatan STATION : Dinas Pertanian

MONTH	1980		1981		1982		1983		1984	
	RAINY DAYS	RAINFALL (mm)	RAINY DAYS	RAINFALL (mm)	RAINY DAYS	RAINFALL (mm)	RAINY DAYS	RAINFALL (mm)	RAINY DAYS	RAINFALL (mm)
January	4	175	16	54	16	196	5	261	13	389
February	4	164	10	234	9	131	2	174	15	268
March	3	160	9	372	14	507	1	75	14	346
April	8	498	9	381	13	374	10	244	15	392
May	4	283	6	308	11	287	10	448	8	233
June	5	195	4	231	5	79	6	130	10	335
July	2	64	2	116	4	851	10	163	12	416
August	1	27	3	238	5	612	5	212	3	21
September	1	1	12	152	10	175	8	211	7	217
October	1	24	9	410	13	298	10	266	9	189
November	7	118	8	476	3	33	11	174	-	-
December	9	244	9	383	13	32	13	352	-	-
Total	49	1,953	97	3,355	116	3,575	91	2,710	106	2,726

1.2 Socio-Economic Conditions

1.2.1 Population

The population of Kabupaten Barito Selatan in 1983 was 125,014 which was approximately 11.9% of the 1,054,600 total population of Kalimantan Tengah Province as shown in Table 1-2-1.

The population density of the Kabupaten was 0.10 persons per ha and indicates the underpopulation of the Kabupaten even though the Kabupaten density was higher than the provincial density of 0.07.

The recent annual average growth rate of population of the Kabupaten is 1.0% which is lower than both the provincial rate of 3.4% and the national rate of 2.2%. This may be due to there being no transmigration programme in the Kabupaten and because of a large outflow of the population to Banjarmasin, the provincial capital.

The population of each Kecamatan and its proportion to the Kabupaten population is shown in Table 1-2-2.

Table 1-2-1 POPULATION BY KABUPATEN

DESCRIPTION	POPULATION	AAGR (%)	AREA (ha)	POPULATION DENSITY (persons/ha)	SURVEY YEAR
KABUPATEN:					
KOTAWARINGIN TIMUR	293,800	3.3	5,070,000	0.06	1984
KAPUAS	364,172	6·0	3,480,000	0·10	1982
BARITO SELATAN	125,014	1·0	1,290,000	0.10	1983
BARITO UTARA	126,398	1.6	3,200,000	0.04	1984
PROVINCE:					
KALIMANTAN TENGAH	1,021,400		15,260,000		1982
	1,054,600	3.4	15,260,000	0.07	1983
	1,088,700		15,260,000		1984
JAWA IS.(Excluding DKI JAKARTA)	91,126,900	1.7	13,159,700	6.92	-
INDONESIA	161,579,500	2·2	191,944,300	0·84	-

Notes :

1. Sources:

   Kabupaten; Kabupaten concerned with the study

   Province ; Jawa and Indonesia:

   Statistical yearbook of Indonesia 1984, published by the Central Statistics Bureau.

2. AAGR ; Average Annual Growth Rate.

Table 1-2-2 POPULATION BY KECAMATAN

Year : 1983

PROVINCE : KALIMANTAN TENGAH

KABUPATEN : BARITO SELATAN

KECAMATAN	POPULATION	PROPORTION (%)
JENAMAS	5,387	4.3
DUSUN HILIR	9,790	7.8
KARAU KUALA	12,384	9.9
DUSUN SELATAN	26,148	20.9
DUSUN UTARA	7,030	5.6
GUNUNG BINTANG AWAI	8,157	6.5
DUSUN TIMUR	14,312	11.5
BENUA LIMA	3,528	2.8
PATANG KEP.TUTUI	3,778	3.0
AWANG	3,865	3.1
DUSUN TENGAH	23,536	18.9
PEMATANG KARAU	7,099	5.7
TOTAL	125,014	100

1.2.2 Land Use

In Kabupaten Barito Selatan, 334,780 ha of the current available land use area, which is approximately 26.0% of the 1,290,000 ha total area of the Kabupaten, is used for living purposes and for industrial activity of the inhabitants of the Kabupaten. It is the total value of columns (1) through (6) in Table 1-2-3.

The current available land use area consists of 165,416 ha of agricultural harvest area, 13,364 ha of residential area and 156,000 ha of usable open space which are 49.4%, 4.0% and 46.6% of the current available land use area respectively.

The agricultural harvest area consists of 13,852 ha of paddy field, 45,299 ha of plantation and 106,265 ha of other cultivated area which are 8.4%, 27.4% and 64.2% of the agricultural harvest area respectively.

It can be realized from the land use that the main industry in the Kabupaten is plantation.

Table 1-2-3

LAND USE

PROVINCE : KALIMANTAN TENGAH

(ha)

KABUPATEN	WET PADDY FIELD	UPLAND PADDY FIELD	OTHER GULTIVATED AREA	PLANTATION AREA	RESIDENTIAL AREA	USABLE OPEN SPACE	RIVER & LAKE	FORESTRY AREA	OTHERS	TOTAL AREA	SURVEY YEAR
KOTAWARINGIN TIMUR	5,760 (0 7)	-	69,930 (8 3)	42,630 (5 1)	3,370 (0 4)	-	23,820 (2 8)	699,500 (82 8)	-	844,710 (100)	1984
KAPUAS	179,054 (5.1)		652,700 (18.8)	-	-	-	10,380 (0.3)	2,101,600 (60.4)	536,266 (15.4)	3,480,000 (100)	1982
BARITO SELATAN	7,291 (0.6)	6,561 (0.5)	106,265 (8.2)	45,299 (3.5)	13,364 (1.0)	156,000 (12.1)	285,060 (22.1)	498,599 (38.6)	171,598 (13.3)	1,290,000 (100)	1983
BARITO UTARA	2,503 (0.1)	21,110 (0.7)	243,354 (7.6)	17,984 (0.6)	912 (0.03)	-	2,670 (0.1)	2,715,717 (84.9)	172,801 (5.4)	3,200,000 (100)	1984

Notes :

1. The value in ( ) denotes the proportion
2. Source ; kabupaten concerned with the study

1.2.3 Agriculture

The cultivated area and food crop production in Kabupaten Barito Selatan in 1983 were 14,877 ha and 26,258 ton respectively as shown in Table 1-2-4. Of food crops, the area and production of paddy which consists of wet paddy and upland paddy was 13,852 ha and 22,123 ton respectively which are 93.1% and 84.1% of the total food crops. The yield rate of paddy production is 1.60 ton per ha. Thus, paddy is the most predominant agricultural crop of the Kabupaten.

As the Table shows, average annual growth rates of area and production of paddy in 1980 through 1983 are 0.5% and 5.4% respectively which shown a favorable development of paddy production. It is desirable that the productivity of paddy becomes higher and this depends upon the future development of irrigation together with river improvement.

The commodity crops, of which rubber, palm and coffee are major, are produced in the plantations. The area and production of plantation crops in 1983 were 48,245 ha and 22,948 tons respectively with current growth rates being 13.3% and 11.0% respectively. Thus the plantation crop which is an export product is important agriculturally. Some changes are expected considering the international balance of supply and demand.

The population of the agricultural sector which is assumed from the employment in the Kabupaten is 81.7% of the total population as shown in Table 1-2-6. Thus it is an agricultural Kabupaten.

Future agricultural development will be needed to improve the productivity of paddy production and also to promote food crops suitable for future demand.

Table 1-2-4 AREA AND PRODUCTION OF FOOD CROPS

KABUPATEN : BARITO SELATAN

CULTIVATED AREA

(ha)

ITEM	YEAR						AAGR
	1979	1980	1981	1982	1983	1984	(%)
PADDY	22,245	13,743	13,564	14,411	13,852	-	0.5
OTHERS	120	254	1,354	2,036	1,025	-	59.2
TOTAL	22,365	13,997	14,918	16,447	14,877	-	2.1

PRODUCTION

(ton)

ITEM	YEAR						AAGR
	1979	1980	1981	1982	1983	1984	(%)
PADDY	30,392	18,905	19,304	21,752	22,123	-	5.4
OTHERS	102	225	5,708	3,471	4,135	-	264.0
TOTAL	30,494	19,130	25,012	25,223	26,258	-	11.1

YIELD RATE

(ton/ha)

ITEM	YEAR						AAGR
	1979	1980	1981	1982	1983	1984	(%)
PADDY	1.37	1.38	1.42	1.51	1.60	-	4.0

Notes :

1. AAGR : Average annual growth rate
2. Source : Kabupaten concerned with the study

Table 1-2-5 AREA AND PRODUCTION OF PLANTATION CROPS
Year : 1983

PROVINCE : KALIMANTAN TENGAH

KABUPATEN	AREA (ha)	PRODUCTION (ton)	AAGR (%) AREA	AAGR (%) PRODUCTION
KOTAWARINGIN TIMUR	0	0	0	0
KAPUAS	0	0	0	0
BARITO SELATAN	48,245	22,948	13.3	11.0
BARITO UTARA	10,062	1,703	2.6	8.8

Table 1-2-6 POPULATION OF AGRICULTURAL SECTOR

PROVINCE : KALIMANTAN TENGAH

KABUPATEN	AGRICULTURAL SECTOR	TOTAL POPULATION	PROPORTION (%)	AAGR (%)	SURVEY YEAR
KOTAWARINGIN TIMUR	182,000	293,800	61.8	4.0	1984
KAPUAS	328,000	364,172	90.0	5.5	1982
BARITO SELATAN	102,000	125,014	81.7	3.6	1983
BARITO UTARA	66,000	126,398	52.3	2.3	1984

Notes :

1. AAGR : Average annual growth rate
2. Source : Kabupaten concerned with the Study

1.2.4 Other Economic Activities

Notable economic activities excluding agriculture in Kabupaten Barito Selatan are forestry, mining and livestock sectors.

The following table shows the current growth of the forestry production in recent years.

	1980	1984	AAGR (%)
Production (m^3)	369,482	305,686	- 4 4

Notes : 1. AAGR : Average annual growth rate
2. Source : Kabupaten data

As can be seen in the above table, the production is tending to decrease because of the government policy which prohibits exporting green wood.

With regard to the mining industry, clay production which is used for a ceramic record approx.502,000 tons in 1984

And the following table shows the current growth of the livestock production in recent years.

	1980	1984	AAGR (%)
Production (ton)	667	970	9 8

Notes : 1. AAGR : Average annual growth rate
2. Source : Kabupaten data

Approx.500 tons excluding the consumption of the Kabupaten itself are exported out of the Kabupaten and the production is tending to increase. Therefore this sector is expected to become continuously prosperous.

1.3 Present Status of Kabupaten Roads

1.3.1 Outline of Road Networks

In Kabupaten Barito Selatan there are national roads centering on Ampah which is located in the center of the Kabupaten. A national road runs from Banjarmasin and divides into two routes at Tamiang Layang. These two routes meet again at Dayu and continue as a single road to Ampah, where it again diverges into two routes. One road runs toward the west leading to Buntok, the Kabupaten capital and the other runs toward the north leading to the neighbouring Kabupaten Barito Utara

These national roads function as regional trunk roads in the Kabupaten. However the Kabupaten roads are not yet developed because the whole area of the Kabupaten is mostly covered by various rivers which are fed from the same catchment area as the Barito river. Accordingly the Kabupaten roads are only developed in the southeastern regions of the Kabupaten.

1.3.2 Road Inventory

From the road inventory data prepared by the Kabupaten, the number and total length of Kabupaten roads to be studied in Kabupaten Barito Selatan are confirmed as 17 links and 132 Km respectively. These figures exclude Kabupaten roads with no data.

According to the data the present status of the Kabupaten roads is as follows:

(1) Density of Kabupaten Roads

The density of the Kabupaten roads is 0.10 m per ha. This is distinctly lower than the national density of 0.48 m per ha and far lower than 2.11 m per ha which is the density in Jawa Island, excluding DKI Jakarta, as shown in the following table. Thus, the Kabupaten lags behind greatly in density of Kabupaten roads.

	Total Length (km)	Area (ha)	Density (m/ha)
Kabupaten : Barito Selatan	132	1,290,000	0.10
Province : Kalimantan Tengah	1,076	20,474,710	0.05
Jawa Is.(Excluding DKI Jakarta)	27,715	13,159,700	2.11
Indonesia	92,038	191,944,300	0.48

Notes : 1. The value for the province is the total value for the Kabupatens included in with the study.

2. The sources of data are as follows:
Kabupaten and Province : Bina Marga Inventory
Jawa and Indonesia : Statistical Yearbook of Indonesia 1984, published by the Central Statistics Bureau

(2) Kabupaten Road Surface Type

The type of surface on the Kabupaten roads in the Kabupaten is shown in Table 1-3-1.

Table 1-3-1 EXISTING ROAD LENGTH BY SURFACE TYPE

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(Km)

I02 (7)	KRK	INH	L.L	DIB	TOTAL
LINK 1	5	4			9
LINK 2			10		10
LINK 3					
LINK 4					
LINK 5		2		2	4
LINK 6		7		1	8
LINK 7	4	2			6
LINK 8		2		8	10

(Km)

I02 (7)	KRK	INH	L.L	DIB	TOTAL
LINK 9	5	5	1		11
LINK 10	1	2			3
LINK 11	10	1		2	12
LINK 12	12		2		14
LINK 13	6	1			7
LINK 14		4			4
LINK 15		2	1	6	9
LINK 16		10			10
LINK 17	7				7
TOTAL	50	49	14	19	132
RATIO	38	37	11	14	(%)

The legend used in the table is as follows:

ASP : Asphalt

KRK : Gravel/Stone/Telford/Water Bound Macadam

TNH : Earth

LL : Others

Comparison of the proportions of surface type in the Kabupaten with other regions is as follows:

	ASP	KRK	TNH/LL
Kabupaten : Barito Selatan	-	52.3	47.7
Province : Kalimantan Tengah	-	29.0	71.0
Jawa Is.(Excluding DKI Jakarta)	56.2	25.0	18.8
Indonesia	26.0	26.6	47.4

Thus, there are no asphalt paved roads. The proportion of low grade roads such as earth roads and others is high. Accordingly the road classification in the Kabupaten is very low.

(3) Surface Condition of Kabupaten Roads

The surface condition of the Kabupaten roads classified as good, fair, poor and bad which are shown as BA, SD, RU and RB respectively, are summarized in Table 1-3-2.

Comparison of the proportions of the various surface conditions of the Kabupaten roads in the Kabupaten with other regions is as follows:

	Good	Fair	Poor	Bad
Kabupaten : Barito Selatan	1.5	33.3	48.5	17.4
Province : Kalimantan Tengah	30.6	25.2	37.5	6.7
Jawa Is.(Excluding DKI Jakarta)	45.6	29.8	19.6	5.0
Indonesia	43.5	21.8	21.1	13.6

Table 1-3-2 EXISTING ROAD CONDITION BY SURFACE TYPE

PROVINCE : KALIMANTAN TENGAH

KABUPATEN : BARITO SELATAN

(%)

ROAD NO.	KRK				LHK				L.L				BTB			
	BA	SD	RU	RB	BA	SD	RU	RB	BA	SD	RU	RB	BA	SD	RU	RB
LINK 1	10	11	14	65		10	23	68								
LINK 2									10	10	78	2				
LINK 3																
LINK 4																
LINK 5						10	63	28						60	30	10
LINK 6					6	9	79	9					5	10	50	35
LINK 7		83	12			50	50									
LINK 8						5	50	45						9	91	
LINK 9		66	14			22	76	2		70	30					
LINK 10	10		90			10	45	45								
LINK 11		50	23	27										50	30	20
LINK 12		7	93							20	80					
LINK 13	4	18	78		5	10	30	55								
LINK 14						30	68	3								
LINK 15						50	30	20		30	50	20		41	21	10
LINK 16					3	19	66	11								
LINK 17	1	73	20	6												
AVERAGE	3	41	44	12	1	20	53	26	3	33	60	6	1	40	41	15
LENGTH		50 Km				49 Km				16 Km				17 Km		
(Km)	2	21	22	6	0	10	26	33	0	5	8	3	0	8	8	3

The surface condition level of the Kabupaten roads in the Kabupaten is much lower than either that of Indonesia or of Jawa Island. The proportion in good condition is extremely low.

Therefore improvement of the Kabupaten roads in poor or bad condition is very desirable.

(4) Terrain Conditions of Kabupaten Roads

The difficulty of road improvement is mainly dependent upon the terrain conditions.

The terrain conditions of the Kabupaten roads, classified as flat, hilly, mountainous and swampy which are shown as DT, BK, GN and RW, are summarized in Table 1-3-3.

The proportions of terrain conditions in the Kabupaten are 41.0% flat, 48.0% hilly, and 11.0% swampy. There is no mountainous area in the Kabupaten. Road construction is anticipated to be not so easy because of the relatively high proportion of swamp.

1.3.3 Bridge Inventory

A bridge inventory showing the existing condition of bridges on the Kabupaten roads in Kabupaten Barito Selatan was prepared by the Kabupaten.

The bridge types are classfied as timber, concrete, steel and others which are shown in the inventory as KY, BT, BJ and LL respectively.

The inventory shown in Table 1-3-4 and Table 1-3-5 indicates a total of 43 bridges with a total length of 471 m of which 41 or 95.3% are timber, 1 or 2.3% are concrete and 1 or 2.3% are others. On the other hand, 25 bridges with a total length of 245 m are required to be newly constructed.

Table 1-3-3 EXISTING ROAD LENGTH BY TERRAIN CONDITION

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(Km)

NO (3)	RW	DT	BK	TOTAL
LINK 1	9		1	9
LINK 2	1	3	6	10
LINK 3				
LINK 4				
LINK 5		4		4
LINK 6		6	2	8
LINK 7			6	6
LINK 8		4	6	10
LINK 9		11		11
LINK 10	1	2		3
LINK 11		3	9	12
LINK 12		3	11	14
LINK 13		3	4	7
LINK 14		4		4
LINK 15		1	8	9
LINK 16	2	7	9	18
LINK 17	1	3	3	7
TOTAL	14	54	64	132
RATIO	11	41	48	(%)

Table 1-3-4 NUMBER AND LENGTH OF BRIDGES

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

<<<< BRIDGE >>>> (UNIT: m)

	EXISTING		NOT EXIST		TOTAL	
LINK NO	NO.	LENGTH	NO.	LENGTH	NO.	LENGTH
1	4	74.00	1	6.00	5	80.00
2	2	40.00			2	40.00
5	1	4.00			1	4.00
6			7	52.00	7	52.00
7			1	16.00	1	16.00
8	6	39.00			6	39.00
9	4	42.00	7	73.00	11	115.00
10	1	26.00	1	30.00	2	56.00
11	3	26.00			3	26.00
12	1	40.00	1	5.00	2	45.00
13			3	31.00	3	31.00
14	1	15.00			1	15.00
15			2	16.00	2	16.00
16	11	88.00	2	16.00	13	104.00
17	9	77.00			9	77.00
TOTAL	43	471.00	25	245.00	68	716.00

Table 1-3-5 NUMBER OF EXISTING BRIDGES BY BRIDGE TYPE

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

<<< BRIDGE >>> (No)

103 (18)	KY	BT	LL	TOTAL
LINK 1	4			4
LINK 2	2			2
LINK 5	1			1
LINK 6				
LINK 7				
LINK 8	4	1	1	6
LINK 9	4			4
LINK 10	1			1
LINK 11	3			3
LINK 12	1			1
LINK 13				
LINK 14	1			1
LINK 15				
LINK 16	11			11
LINK 17	9			9
TOTAL	41	1	1	43
RATIO	95	2	2	(%)

The number of existing bridges by span length is as follows:

Bridge Type	Span Length (m)										
	〈3	〈5	〈8	〈10	〈12	〈14	〈16	〈18	〈20	〈99	Total
Timber	1	23	17	-	-	-	-	-	-	-	41
Concrete	-	1	-	-	-	-	-	-	-	-	1
Steel	-	-	-	-	-	-	-	-	-	-	-
Others	-	1	-	-	-	-	-	-	-	-	1
Total	1	25	17	-	-	-	-	-	-	-	43

Thus, most of the existing bridges on the Kabupaten roads are timber and the majority of spanlengths is within the range of 3 m to 5 m.

1.3.4 Traffic

Inventories of the average daily traffic (ADT) on the Kabupaten roads in Kabupaten Barito Selatan were prepared by the Kabupaten and are shown in Chapter 2.

From the inventories, total value of average daily trips by vehicle type and their proportions in the Kabupaten in 1985 are summarized as follows:

	SEDAN	BUS	TRUCK	MOTOR-CYCLE	TOTAL
Total Trips	36	15	80	325	456
Proportion (%)	7.89	3.29	17.54	71.27	100.00

Source : Bina Marga Inventory

The proportions of registered vehicles by vehicle type are as follows:

	SEDAN	BUS	TRUCK	MOTOR-CYCLE	TOTAL
Proportion (%)	5.93	0.00	5.40	88.67	100.00

Source : Kabupaten.

Thus, the proportion of motorcyles in the Kabupaten is by far the highest.

From the above tables the following can be observed:

- Number of total trips might be underestimated
- Proportions are probably reasonable.

Essentially, for estimation of future traffic volumes past and present traffic data together with the trend in the number of registered vehicles are important basic data. However the data obtained for the study was traffic count data for each road link in 1985 and of low reliability.

Therefore the future traffic volumes are estimated by the calculation process recommended in chapter 3 of the Main Report.

Chapter 2 ESTIMATIONS OF FUTURE TRAFFIC VOLUME AND BENEFIT

2.1 Future Traffic Volume

2.1.1 Traffic Growth Rate

The traffic growth rate used for estimation of the future traffic volume on the Kabupaten roads was estimated by the following calculation process.

Growth of Production Basis "A":

$$\sqrt{\text{Annual Population Growth of the Kabupaten} \times \text{Growth of the Total Cultivated Area}}$$

Growth of Productivity "B" :

$$\sqrt{\text{Growth of the Total Paddy Field Area} \times \text{Growth of the Paddy Production per ha}}$$

Traffic Growth Rate: Initial estimated figure:

$$\overline{GR'} = \sqrt{A \times B}$$

Traffic Growth Rate GR =Final adjusted figure:

$$\sqrt{GR' \times \text{Trend of GDP/Capita of the Province Concerned}}$$

Results of the estimation are shown in Table 2-1-1.

Table 2-1-1 TRAFFIC GROWTH RATE ESTIMATION

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

A)	Growth Rate of Population	:	1.00 (%)
B)	Growth Rate of Cultivated Area	:	1.50 (%)
C)	Growth Rate of Rice field	:	0.50 (%)
D)	Growth Rate of Rice yield rate	:	4.00 (%)
E)	Growth Rate of GDP / capita	:	9.50 (%)
a)	Geometrical Mean (A x B)	:	1.25 (%)
b)	Geometrical Mean (C x D)	:	2.24 (%)
c)	Geometrical Mean (a x b)	:	1.74 (%)
d)	Geometrical Mean (c x E)	:	5.55 (%)
	TRAFFIC GROWTH RATE	:	5.55 (%)

2.1.2 Present and Future Traffic Volume

The future traffic volumes on the Kabupaten roads in 1998 for the Project life time of ten years were estimated by the following formula :

$$Tn = Te\ (1 + r)^n$$

Where :

Tn : Future traffic volume n years later
Te : Traffic volume in 1985
r : Traffic growth rate

The results are shown in Table 2-1-2 together with the traffic volume in 1985.

Table 2-1-2 EXISTING AND FUTURE TRAFFIC VOLUME

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(SPD : 1/2)

	INVENTORY (1985)					RATE	AFTER 13 YEARS (1998)					CLASS
LINK NO	HBL	BUS	TRUK	SPD	TOTAL		HBL	BUS	TRUK	SPD	TOTAL	
1	2	2	1	20	15	5.6%	4	4	2	40	30	IIIC
2	2	1	10	25	26	5.6%	4	2	20	50	52	IIIB-2
3	0	0	0	0	0	5.6%	0	0	0	0	0	IIIC
4	0	0	0	0	0	5.6%	0	0	0	0	0	IIIC
5	2	0	10	60	42	5.6%	4	0	20	121	85	IIIB-2
6	1	1	2	10	9	5.6%	2	2	4	20	18	IIIC
7	3	1	4	40	28	5.6%	6	2	8	81	57	IIIB-2
8	4	6	10	10	25	5.6%	8	12	20	20	50	IIIB-2
9	0	0	0	0	0	5.6%	0	0	0	0	0	IIIC
10	0	0	0	0	0	5.6%	0	0	0	0	0	IIIC
11	10	0	16	50	51	5.6%	20	0	32	101	103	IIIB-2
12	2	1	7	10	15	5.6%	4	2	14	20	30	IIIC
13	1	1	5	10	12	5.6%	2	2	10	20	24	IIIC
14	0	0	0	10	5	5.6%	0	0	0	20	10	IIIC
15	3	0	2	25	18	5.6%	6	0	4	50	36	IIIC
16	4	2	10	25	29	5.6%	8	4	20	50	59	IIIB-2
17	2	0	3	30	20	5.6%	4	0	6	61	40	IIIC
PERCENT	7.89	3.29	17.54	71.27			7.89	3.29	17.54	71.27		

2.2 Benefit

2.2.1 Benefit Estimation Method

Generally, estimation of the benefit on each Kabupaten road due to the Project was made by analyzing the direct benefit i.e. the VOC reduction benefit, which was estimated by comparing "with project" and "without project" based upon the future traffic volume on the road. However for the following road links it was decided to estimate the indirect benefit through the producer's surplus benefit.

a) Road links with present traffic volume (ADT) less than 60 equivalent 4-wheel vehicles.

b) Road links with no 4-wheel vehicle operation at present.

The indirect benefit was changed into the future traffic volume and the VOC reduction benefit was estimated.

The VOC adopted for the estimation is shown in Table 2-2-1.

Table 2-2-1 VEHICLE OPERATION COST ON KABUPATEN ROADS

(KM)

SURFACE	CONDITION	SEDAN	BUS	TRUCK	MOTORCYCLE
ASPHALT	GOOD	104.7	86.2	85.4	15.9
	Fair	125.5	101.0	98.0	18.2
	Poor	164.1	135.2	138.5	22.8
	Bad	222.1	202.0	205.0	29.1
GRAVEL	Good	125.7	101.4	102.5	18.5
	Fair	145.0	124.6	127.1	21.1
	Poor	198.6	172.6	178.4	27.1
	Bad	242.7	228.9	231.2	31.8
EARTH	Fair	201.8	180.0	185.1	28.0
	Poor	240.7	218.2	225.8	31.8
	Bad	264.9	278.0	281.7	35.5

Source : Bina Marga

Table 2-2-2 FUTURE TRAFFIC VOLUME ESTIMATED BY THE PRODUCER'S SURPLUS

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(1998)

LINK NO	CLASS	SURFACE	MOBIL	BUS	TRUCK	SEPEDA	TOTAL
1	IIIB-1	ASP	51	21	113	459	415
2	IIIB-1	ASP	27	11	61	248	223
5	IIIC	KRK	4	1	8	32	29
6	IIIB-2	KRK	15	6	34	140	125
7	IIIC	KRK	5	2	10	42	38
8	IIIB-2	KRK	8	3	18	74	66
9	IIIB-1	ASP	35	15	78	316	286
10	IIIB-2	KRK	20	8	44	177	161
11	IIIB-2	KRK	14	6	32	129	117
12	IIIB-2	KRK	17	7	38	155	140
13	IIIB-2	KRK	15	6	33	133	121
14	IIIB-2	KRK	21	9	47	192	173
15	IIIB-2	KRK	11	4	24	96	87
16	IIIB-1	ASP	27	11	61	248	223
17	IIIC	KRK	5	2	10	42	38

2.2.2 Benefit

The benefit estimation was carried out for each Kabupaten road. Table 2-2-3 shows a sample of the result of benefit estimation. In the table "surplus" and "VOC" show the estimation method utilized and III A, III B-1, III B-2 and III C show the road classification.

Table 2-2-3

RESULTS OF BENEFIT ESTIMATION

KABUPATEN : BARITO SELATAN

(1000Rupiah)

	LINK 1	LINK 2	LINK 5	LINK 6	LINK 7	LINK 8	LINK 9	LINK 10	LINK 11	LINK 12
	9 Km	10 Km	4 Km	8 Km	6 Km	10 Km	11 Km	3 Km	12 Km	14 Km
	IIIB-1	IIIB-1	IIIC	IIIB-2	IIIC	IIIB-2	IIIB-1	IIIB-2	IIIB-2	IIIB-2
YEAR	Surplus	Surplus	Surplus	Surplus	Surplus	Surplus	Surplus	Surplus	Surplus	Surplus
1988	0	0	0	0	0	0	0	0	0	0
1989	104549	34587	2006	20107	2469	11010	48899	9800	17554	28094
1990	104549	34587	2006	20855	2594	11359	50210	9984	17554	28583
1991	104549	35027	2006	21281	2594	11359	50727	10124	17554	28583
1992	104549	36043	2139	21700	2594	11359	51626	10282	17614	28583
1993	104549	36043	2139	21737	2594	11359	52101	10309	17614	28583
1994	104549	36520	2139	22193	2594	11359	52948	10591	17614	28583
1995	104549	37260	2139	22582	2608	11428	54281	10902	17614	28583
1996	104549	37700	2139	23038	2608	11428	55139	10929	17953	28583
1997	104549	37700	2139	23494	2608	11428	55739	11086	17953	28583
1998	105626	38141	2139	23604	2608	11428	57360	11383	17953	28583
SUM	1046567	363608	20991	220591	25871	113517	529030	105390	176977	285341
COST	608150	182830	4726	117576	3721	49307	278513	57887	84255	146884
/Km	67572	18283	1182	14697	620	4939	25319	19296	7021	10492

Chapter 3 ENGINEERING

3.1 Design Criteria and Specification

3.1.1 Geometric Design Criteria

Currently a technical standard for improvement of Kabupaten roads i.e. PETUNJUK TEKNIS INPRES PENUNJANGAN JALAN KABUPATEN, TAHUN 1984-1985 is established by Bina Marga.

The geometric design criteria in the above standard are recommended to be adopted in general for the Project. Following discussions with Bina Marga, exceptions to this are allowed for Pavement width and pavement type to minimize the construction cost of the Kabupaten road improvement, if necessary. The geometric design criteria adopted for the Project are shown in Table 3-1-1. The typical cross sections of Kabupaten roads are shown in Fig. 3-1-1.

3.1.2 Loading Specification

The LOADING SPECIFICATIONS FOR HIGHWAY BRIDGES BY DIRECTORATE GENERAL BINA MARGA is used in principle as the basic specification of loading and the TECHNICAL STANDARD FOR KABUPATEN ROADS compiled by Bina Marga shows that the design live load for bridges on Kabupaten roads is 70% of the Bina Marga live road. However, after discussions with Bina Marga the following loads were decided as the design live loads for the standard bridges of Kabupaten roads:

a. 50% of Bina Marga live load (hereinafter BM 50) is applied for concrete and timber bridges on roads of III A classification.

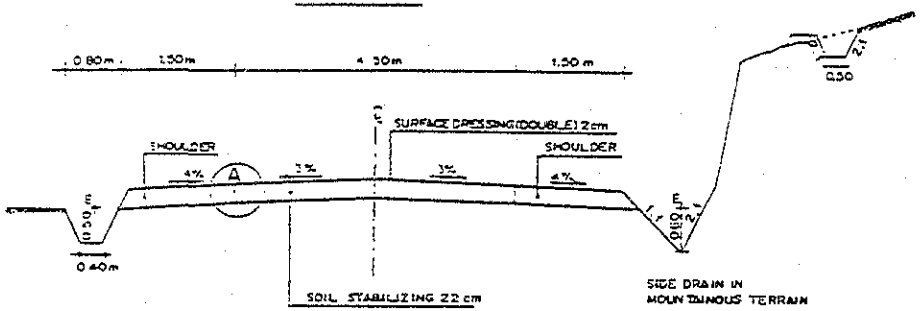
b. 10-ton truck load is applied for timber bridges on roads of III B-1, III B-2 and III C classification.

Table 3-1-1 DESIGN CRITERIA FOR KABUPATEN ROADS

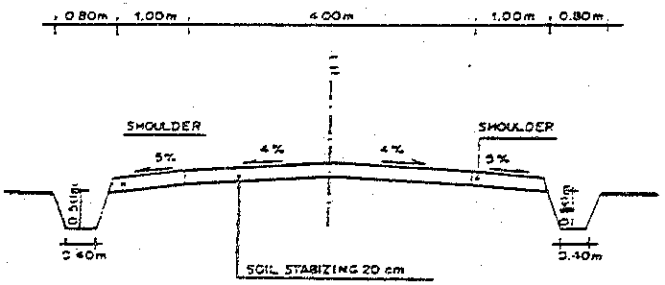
ROAD CLASSIFICATION		CLASS III A			CLASS III B-1			CLASS III B-2			CLASS III C		
SURFACE TYPE		ASPHALT SEAL (DOUBLE)			ASPHALT SEAL (SINGLE)			GRAVEL			GRAVEL		
TRAFFIC VOLUME : ADT (Forecast 10 th year average per day)		3000 - 500			500 - 200			200 - 50			50		
T E R R A I N		FLAT TO ROLLING	HILLY	MOUNT-AINOUS	FLAT TO ROLLING	HILLY	MOUNT-AINOUS	FLAT TO ROLLING	HILLY	MOUNT-AINOUS	FLAT TO ROLLING	HILLY	MOUNT-AINOUS
TRAFFIC LANES		1+	1+	1+	1+	1+	1+	1+	1+	1+	1	1	1
DESIGN SPEED (Km/hr)	DESIRABLE	70	60	40	70	40	30	60	40	30	50	30	AS PRACTI-CABLE
	MINIMUM	30	30	30	30	30	AS PRACTI-CABLE	30	30	AS PRACTI-CABLE	30	AS PRACTICABLE	
GRADIENT (LIMITING) (%)	DESIRABLE	4	5	8	4	6	8	4	7	8	5	8	12
	MAXIMUM	7	7	10	7	8	10	7	9	12	7	12	16
PAVEMENT WIDTH (M)	DESIRABLE	6.0	6.0	6.0	4.5	4.5	4.5	4.5	4.5	4.5	3.5	3.5	3.5
	MINIMUM	4.5	4.5	4.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0
SHOULDER WIDTH (M)	DESIRABLE	2.0	1.5	1.5	1.5	1.5	1.0	1.5	1.0	1.0	1.0	1.0	0.75
	MINIMUM	1.5	1.0	0.75	1.0	1.0	0.75	1.0	0.75	0.5	0.75	0.5	0.5
ROAD BED WIDTH (M)	DESIRABLE	10.0	9.0	9.0	8.0	7.5	6.5	7.5	6.5	6.5	5.5	5.5	5.0
	MINIMUM	6.0	6.0	6.0	5.5	5.5	5.0	5.5	5.0	4.5	4.5	4.0	4.0
RIGHT OF WAY (M)	DESIRABLE	16			12			12			12		
	MINIMUM	12			10			10			8		
ROAD CAMBER (%)	PAVEMENT	3			3			4			4		
	SHOULDER	4			4			5			5		

Fig. 3-1-1 STANDARD ROAD CROSS SECTIONS

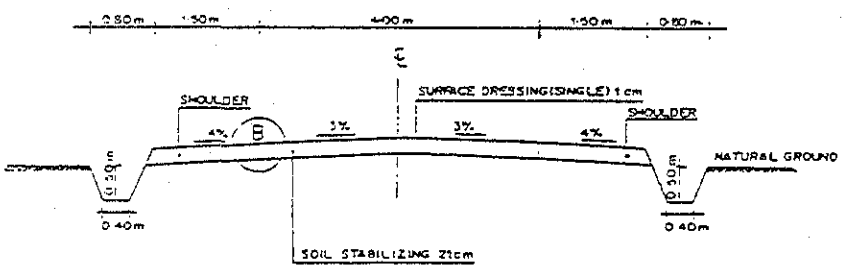
CLASS III A



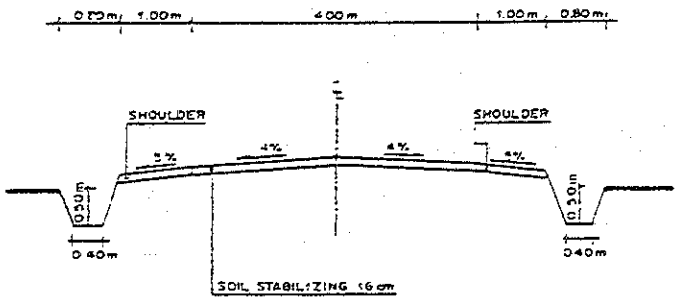
CLASS III B-2



CLASS III B-1



CLASS III C



3.2 Pavement Design

3.2.1 Design Conditions

From the engineering data prepared by the Kabupaten it is noted that the pavement structure of the Kabupaten roads seems to have been determined without adequate designs, therefore the Kabupaten roads generally have insufficient capacity. The standards generally used for highway pavement design such as Road Note 29, Road Note 31 and AASHTO are not suitable for Kabupaten roads with small traffic volumes and loads.

Therefore formulae suitable for the pavement design of Kabupaten roads are recommended as described in Chapter 5 of the Main Report.

The following are important factors for the design of pavement thickness.

1) Design Traffic Volume

As the pavement thickness is designed for each road classification the design traffic volume of which the target year is 1998, is adopted for each classification as follows:

Road Classification	Design Traffic Volume (vpd)
III A	1,000
III B-1	500
III B-2	200
III C	50

2) Strength of Roadbed

The CBR value of the existing roadbed is a very important factor for the pavement design but no results are available from CBR tests on the Kabupaten roads.

CBR of the laterite is generally in the range of CBR 4 to 10. However site CBR tests should be conducted before construction to finally decide the pavement thickness.

3.2.2 Pavement Structure

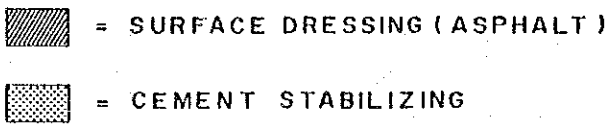
Fig. 3-2-1 shows the standard pavement structures adopted for the Kabupaten roads. In the Kabupaten aggregate material is difficult to obtain and so the price is extremely high, therefore the cement stabilization method is recommended for both the base and sub-base courses as a substitute for crusher run or river gravel.

Fig. 3-2-1

PAVEMENT STRUCTURE
(CEMENT STABILIZING)

(cm)

CBR	ROAD CLASSIFICATION			
	III A	III B-1	III B-2	III C
6	11 / 22 / 24	11 / 21 / 22	20	16



3.3 Design of Bridges and Other Structures

3.3.1 Standard Bridge

There are so many bridges to be improved or to be newly constructed on the Kabupaten roads in the Project Area that it is very difficult to prepare an individual design for each bridge. Therefore, standardization is recommended as being necessary for the bridge design with conclusions as deseribed below.

(1) Bridge Type

1) Superstructure

A timber beam bridge (hereinafter timber bridge has been finally selected regardless of road classification by the agreement of Bina Marga after studying the actual rurall condition of bridge construction. Fig. 3-3-1 shows the cross section of the standard type.

2) Substructure

Taking account of the actual combinations of super and substructure types noted from the field survey, timber pile barts are recommended as standard because of ease of construction and economy.

3) Foundation

There is no information of subsoil conditions in the inventory data. However, timber piles of 20 cm diamenter are generally recommended as piles of this type are in common use.

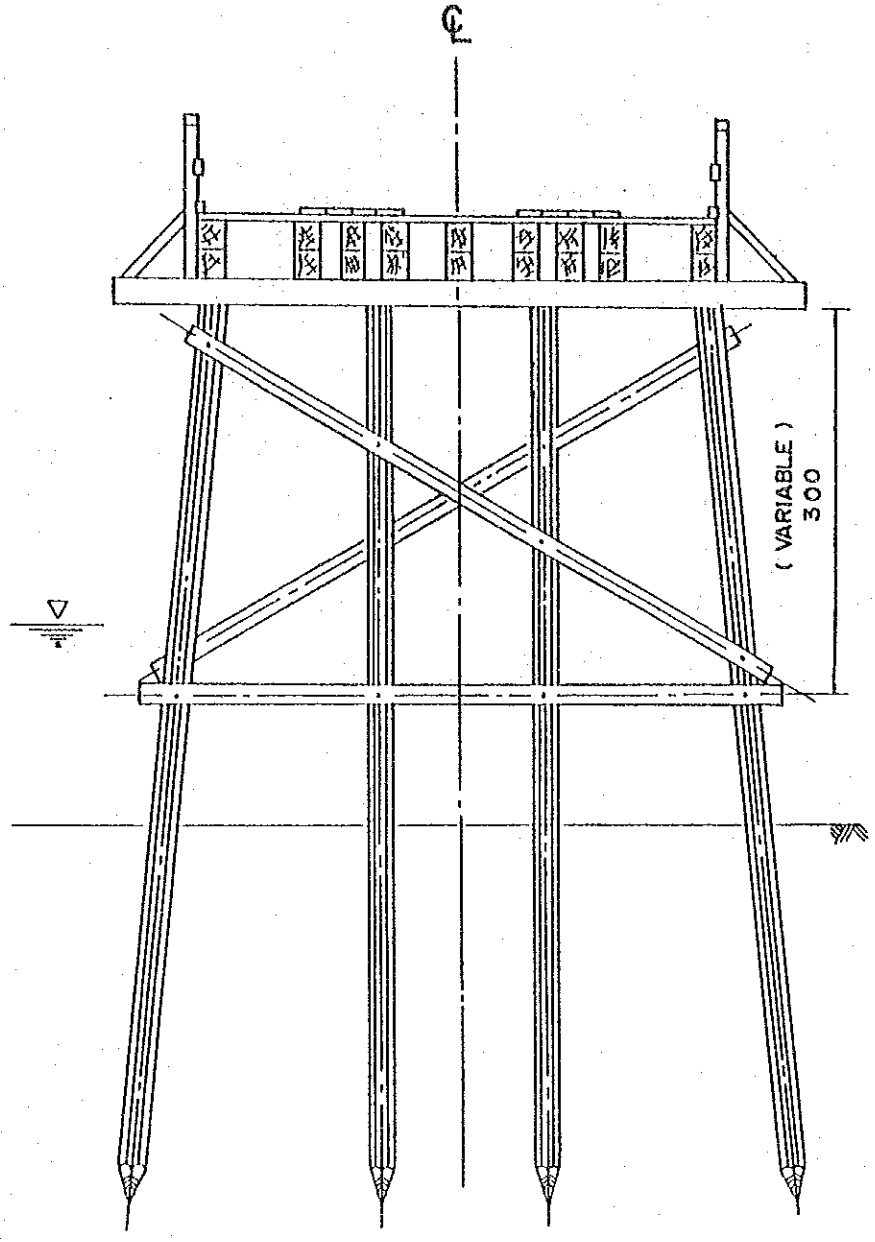
The pile length is suggested to be a minimum of 3 meters under the bottom of the foundation or river bed.
The length and number of piles should be decided in order to be adequate for the condition of the foundation materials.

(2) Bridge Width

The effective bridge width for the standard bridge has been generally decided as 4.0 m through discussions with Bina Marga and considering the actual width of Kabupaten roads.

Fig. 3-3-1 CROSS SECTION OF STANDARD BRIDGE

TIMBER BRIDGE



(3) Span Length

The range of span lengths are determined as:

Timber bridge: 3.0, 5.0 and 8.0 m

3.3.2 Other Structures

Culverts and retaining walls shown in Fig. 3-3-2 and Fig. 3-3-3 are recommended as standard structures.

(1) Culvert

The following two culvert types have been adopted for the tranverse drainage.

a) Reinforced concrete pipe culvert Ø 80 cm m
b) Rubble in mortar box culvert with RC slab 80 cm X 80 cm

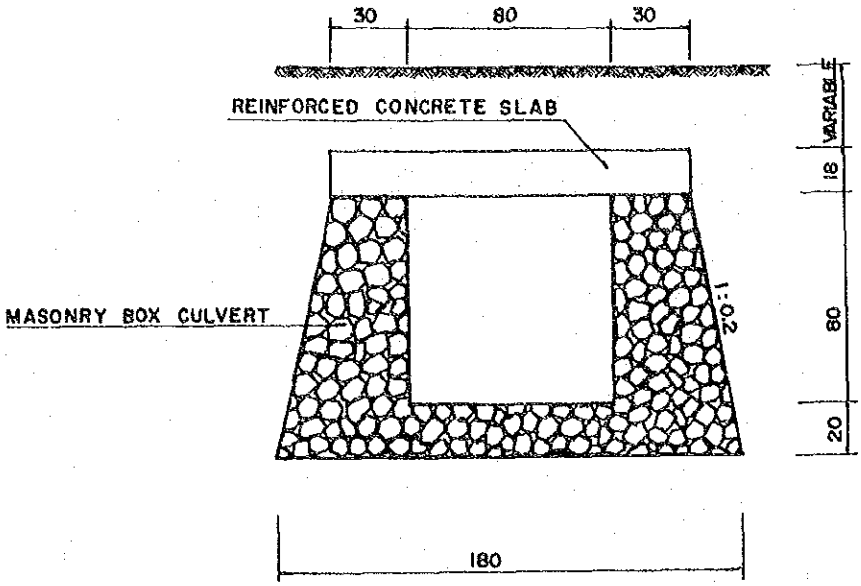
(2) Retaining Wall

The following two types of retaining walls have been adopted because of ease of construction, economy and familiarity in Indonesia.

a) Rubble in mortar retaining wall
b) Timber retaining wall

Fig. 3-3-2 STANDARD CULVERTS

80 x 80 RUBBLE IN MORTAR BOX CULVERTS



Ø 80 RENFORCED CONCRETE PIPE CULVERT

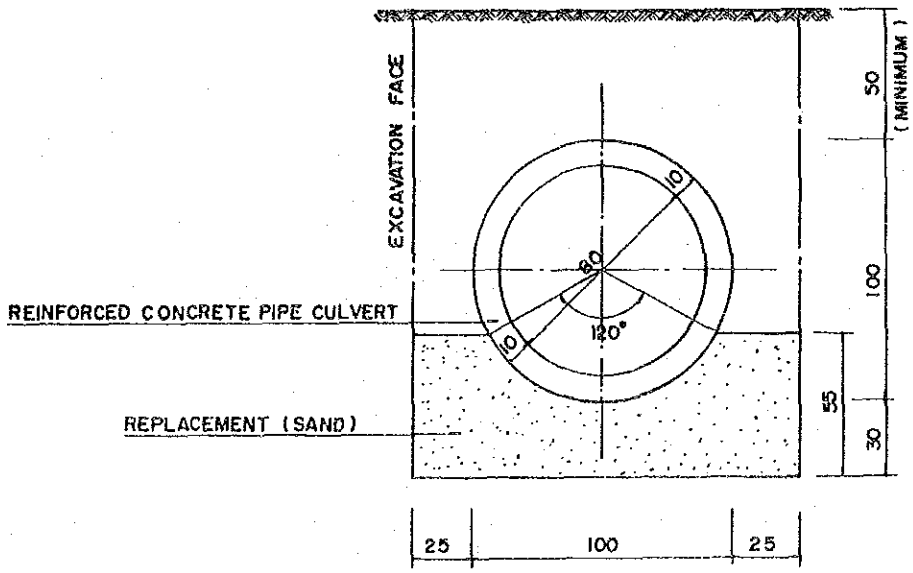
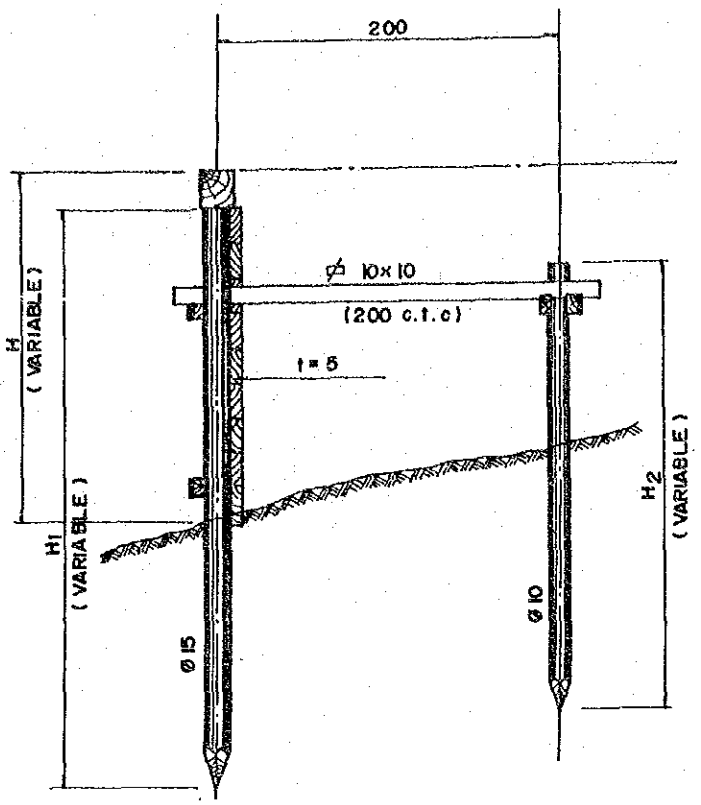
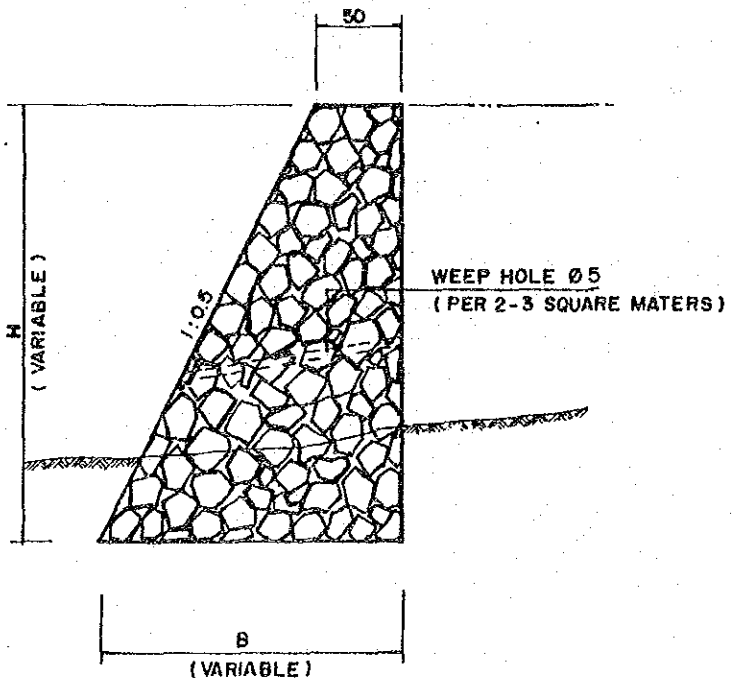


Fig. 3-3-3 STANDARD RETAINING WALLS

TIMBER RETAINING WALL



RUBBLE IN MORTAR WALL



3.4 Selection of Equipment Types

From the results of comparison of two types of Kabupaten road construction methods, i.e. equipment intensive method and labour intensive method construction methods for major works were basically decided as shown in Table 3-4-1.

Table 3-4-1 CONSTRUCTION METHODS FOR MAJOR WORKS

METHOD	WORK TYPE
Equipment Intensive	Earthwork, Base Course and Subbase Course
Labour Intensive	Surface Dressing, Drainage, Bridge and Other Structures.

3.4.1 Points to be Considered for the Selection

Full consideration was given to the following points in studying the selection of equipment type.

a. Most of the construction in the Project is pavement works for road improvement.

b. The pavement width adopted is equal to or less than 4.5 m and therefore large sized equipment is omitted from the selection process.

c. Equipment should be capable of with standing the heavy rainfall and poor soil quality. Equipment for construction in swampy areas is considered if necessary.

d. Uniformity of equipment types with existing equipment is considered to facilitate repair of the equipment in the provincial work shop.

e. Since the scale of the construction is small and transportation of equipment will frequently be necessary, wheel type equipment has been selected as much as possible as this can move by itself or by being towed.

f. The road like to be improved are scattered all over the Kabupatens and therefore a low bed truck or equivalent is necessary for transportation of crawler type equipment. It is desirable to protect the existing pavement from damage caused by the movement of crawler type equipment on the existing roads.

g. The capacity of the equipment has been decided taking into consideration the construction volume and the combination of equipment in the main work.

3.4.2 Combinations of Equipment for Major Works and Maintenance

The combinations of equipment for major works and maintenance are listed in Table 3-4-2 and 3-4-3 respectively.

Table 3-4-2 EQUIPMENT OF ONE WORK GANG FOR MAJOR TYPES OF WORK

TYPE OF WORK	EQUIPMENT REQUIRED	
1. Site Clearing in Light Bush	1- Bulldozer 90 HP 2- Dump Truck 3.0 Ton	1- Wheel Loader 1.2 m^3
2. Excavation & Embankment		
i) Normal Fill	1- Bulldozer 90 HP 1- Vibratory Roller 4.0 Ton (D&T)	1- Water Tank Truck 4,000 Ltr
ii) Fill by Borrow Material	1- Bulldozer 90 HP 3- Dump Truck 3.0 Ton	1- Wheel Loader 1.2 m^3
iii) Fill in Swamp	1- Swamp Bulldozer 90 HP 1- Water Tank Truck 4,000 Ltr	1- Vibratory Roller 4.0 Ton (D&T)
iv) Excavation to Spoil	1- Bulldozer 90 HP 1- Wheel Loader 1.2 m^3	4- Dump Truck 3.0 Ton
3. Subgrade Preparation	1- Motor Grader 75 HP 1- Vibratory Roller 4.0 Ton (D&T)	1- Water Tank Truck 4,000 Ltr
4. Subbase Course	1- Motor Grader 75 HP 1- Vibratory Roller 4.0 Ton (D&T)	1- Water Tank Truck 4,000 Ltr
5. Base Course	1- Motor Grader 75 HP 1- Vibratory Roller 4.0 Ton 1- Portable Crusher/Screens 30-40 Ton/H	1- Water Tank Truck 4,000 Ltr
6. Cement Stabilizing	1- Motor Grader 70 HP 1- Bulldozer 90 HP 1- Wheel Loader 1.2 m^3 1- Flat Bed Truck 3.0 Ton	1- Vibratory Roller 4.0 Ton (D&T) 1- Road Stabilizer 1- Water Tank Truck 4,000 Ltr
7. Surface Course	1- Asphalt Sprayer 850 Ltr 1- Tyre Roller 8-15 Ton 1- Portable Crusher/Screens 30-40 Ton/H	1- Flat Bed Truck 3.0 Ton
8. Concrete	1- Concrete Mixer 0.5 m^3 1- Water Pump 200 Ltr/Min 1- Concrete Vibrator 3.3 HP	1- Flat Bed Truck 3.0 Ton 1- Hand-Guided Vibratory Roller 1000 Kg

Table 3-4-3 EQUIPMENT OF ONE WORK GANG FOR MAINTENANCE

TYPE OF WORK	EQUIPMENT REQUIRED
Road	1- Motor Grader
	1- Tyre Roller 8-15 Ton
	1- Hand-Guided Vibratory Roller 1000 Kg
	1- Flat Bed Truck 3.0 Ton
	1- Dump Truck 3.0 Ton
Bridge and Other Structure	1- Flat Bed Truck With Crane 3.0 Ton

3.5 Workshop and Laboratory

3.5.1 Policy of the Kabupaten Workshop

A workshop will be provided for each Kabupaten. The function of the workshop is to cope with requests from the construction site. The main service will be routine maintenance while the secondary service will be light repairs which can be carried out by changing parts. Dismantling and assembling of units which need setting or adjustment using special equipment or facilities will not be carried out in the Kabupaten workshop. Such repairs are planned to be carried out by the provincial workshop or the regional Workshop of Bina Marga.

Accordingly the main tasks of the Kabupaten workshop are as follows:

1) Administration for and storage of equipment
2) Routine maintenance and light repair of equipment
3) Storage and supply of spare parts
4) Operation of equipment including crushing plant.

3.5.2 Workshop Equipment and Tools

Equipment and tools for the workshop are recommended as shown in Table 3-5-1.

Table 3-5-1 WORKSHOP EQUIPMENT AND TOOLS

DESCRIPTION	QUANTITY
Upright Drilling Machine	1 Set
Electric Hand Drill	1
Electric Portable Grinder	1
Disc Grinder	1
Bench Electric Grinder	1
Engineer's Vice	1
DC Electric Welder with Engine	1 Set
Portable Hydraulic Jack, Screw Head	1
Hydraulic Jack	1
Grease Gun	2
Suction Pump for Oil Recovery	2
High Pressure Grease Pump	1

continued

DESCRIPTION	QUANTITY
Drum Opening Spanner	1
Silicon Normal Charger	1
Tyre Changer Air Operated	1
Tyre Service Tool Set	1
Tyre Pressure Gauge	1
Automatic Tyre Inflator	1
Plug Cleaner and Tester	1
Mechanics Tool Set, Heavy Equipment	1
Mechanics Tool Set, Large Vehicle	1
Portable Air Compressor	1
Electric Cord Reel, 15 A, 50 m	1
Oil Measure, Polyethylene	1
Funnel 200 mm, Steel	3
Hand Truck (Cart), 4-Wheel	1
Nylon Sling, 10 ton	2
Chain Block, 1 ton	2
Wire Rope (for sling), 1.8 ton	2
Wire Rope (for sling) 3.2 ton	2
Generator	1

3.5.3 Laboratory

For quality control of construction in the Project it is recommended that a laboratory is provided for each Kabupaten. For each laboratory, provision of laboratory test equipment for the following tests is recommended:

- Physical characteristic, compaction and strength tests for the road bed and pavement materials.
- Slump and strength tests for the bridge concrete.

In the laboratory a fixed water tank should be provided for CBR tests and curing of concrete specimens.

The proposed laboratory equipment is listed in Table 3-5-2.

Table 3-5-2 LABORATORY TEST EQUIPMENT

DESCRIPTION	QUANTITY
Soil Moisture Test Set (JIS A1203)	1
Liquid Limit Set (JIS A1205)	1
Plastic Limit Set (JIS A1206)	1
Compaction Set (JIS A1210)	1
CBR Laboratory Set, Mechanical (JIS A1211)	1
Sand Density Apparatus (JIS A1214)	1
Aggregate Test Sieve Set	1
Portable Cone Penetrometer	1
Compression & Bending Test Machine	1
Cylinder Mould (JIS A1132, 1108)	9
Slump Test Apparatus (JIS A1101)	2

To conduct the surveys necessary for road and structure construction such as centering, profile leveling, cross section leveling etc., the surveying equipment listed in Table 3-5-3 recommended.

Table 3-5-3 SURVEYING EQUIPMENT

DESCRIPTION	QUANTITY
Transit	1
Level	1
Staff	3

Chapter 4 CONSTRUCTION AND MAINTENANCE COST ESTIMATIONS

4.1 Unit Price

With regard to the unit prices of materials and labor, the data were collected from each Kabupaten through Bina Marga. The collected data were compared with those of Jakarta using BAHAN BANGUNAN DKI-JAKARTA MAY & JUNE 1985 compiled by PUSAT INFORMASI TEHNIK PEMBANGUNAN, and then finalized.

4.1.1 Unit Labour Price

The unit labour prices of Kabupaten Barito Selatan and other Kabupatens in Kalimantan Tengah Province are shown in Table 4-1-1.

Table 4-1-1 UNIT LABOUR PRICE

(Rp)

KABUPATEN	MAN	SKL LAB	CAP	MAS	LAB	DRIV	OPE
Kotawaringin Timur	2,500	2,000	2,500	2,500	1,500	3,000	7,500
Kapuas	2,200	2,000	2,500	2,500	1,650	2,200	2,750
Barito Selatan	4,000	3,250	2,500	3,000	2,750	3,000	3,500
Barito Utara	3,000	3,600	3,000	3,000	2,250	3,300	3,300
Average	2,925	2,713	2,625	2,750	2,038	2,875	4,263

Notes :

MAN : Mandur
SKL LAB : Skilled Labour
CAP : Carpenter
MAS : Mason
LAB : Labourer
DRIV : Driver
OPE : Operater

4.1.2 Unit Price of Materials

Table 4-1-2 shows the unit price of materials for Kabupaten Barito Selatan together with for other Kabupatens in Kalimantan Tengah Province.

The unit price of river stone in the Kabupaten which has direct effects upon construction costs is significantly high.
Stone and sand are not produced in the Kabupaten. Therefore unit prices of these materials include the shipping cost from the producing Kabupaten.

Table 4-1-2 UNIT PRICE OF MATERIALS

(Rp)

MATERIAL	UNIT	KOTAWARI-NGIN TIMUR	KAPUAS	BARITO SELATAN	BARITO UTARA	AVERAGE
Bitumen	L	500	500	1,000	400	600
Asphalt oil	L	800	800	800	800	800
Gasoline	L	250	250	250	250	250
Sand	M^3	7,500	7,000	7,500	10,000	8,000
Cement	bag	5,000	5,000	5,000	5,000	5,000
River Stone	M^3	15,000	20,000	30,000	10,000	18,750
Steel moulds	Set	8,500	8,500	8,500	8,500	8,500
Timber	M^3	75,000	70,000	75,000	75,000	73,750
Paint	L	2,000	3,000	3,000	3,000	2,750
Reinforcing Steel	Kg	1,000	1,000	1,000	1,000	1,000
Tying Wire	Kg	1,500	1,500	1,500	1,500	1,500

4.1.3 Hourly Equipment Cost

The hourly equipment cost for Kabupaten is shown in Table 4-1-3.

Table 4-1-3

HOURLY EQUIPMENT COST

PROVINCE : KALIMANTAN TENGAH
KABUPATEN : BARITO SELATAN

(UNIT : Rp) (6'85)

CODE NO	EQUIPMENT NAME	CLASS	LOCAL COST OWNERSHIP	LOCAL COST OPERATION	LOCAL COST SUB-TOTAL	FOREIGN COST OWNERSHIP	FOREIGN COST OPERATION	FOREIGN COST SUB-TOTAL	TOTAL COST
	Bulldozer	120 HP	272	13,292	13,564	7,769	1,029	8,798	22,362
	Bulldozer/Ripper	120 HP	298	14,307	14,605	8,499	1,583	10,082	24,687
	Swamp Bulldozer	120 HP	311	14,551	14,862	8,879	1,654	10,533	25,395
	Bulldozer	90 HP	173	8,964	9,137	4,914	650	5,564	14,701
	Bulldozer/Ripper	90 HP	186	9,556	9,742	5,299	987	6,286	16,028
	Bulldozer	65 HP	123	6,513	6,636	3,499	463	3,962	10,598
	Bulldozer/Ripper	65 HP	134	6,965	7,099	3,819	711	4,530	11,629
	Swamp Bulldozer	90 HP	185	9,546	9,731	5,284	984	6,268	15,999
	Swamp Bulldozer	65 HP	142	6,882	7,024	4,049	754	4,803	11,827
	Motor Grader	110 HP	243	11,436	11,679	6,919	1,289	8,208	19,887
	Motor Grader	75 HP	168	7,837	8,005	4,779	890	5,669	13,674
	Motor Grader	65 HP	151	6,893	7,044	4,299	801	5,100	12,144
	Road Stabilizer	W=1850 mm	301	3,398	3,699	8,594	426	9,020	12,719
	Vibratory Roller	4 ton	102	3,430	3,532	2,899	384	3,283	6,815
	Hand-guide Vib. Roller	1000 Kg	77	616	693	849	29	878	1,571
	Tire Roller	8-15 ton	109	7,672	7,781	3,106	102	3,208	10,989
	Vibratory Roller (D&T)	4 ton	102	3,430	3,532	2,899	384	3,283	6,815
	Hand-guide Vib. Roller	600 Kg	54	421	475	600	20	620	1,095
	Rough Terrain Crane	10 ton	352	13,338	13,690	10,039	748	10,787	24,477
	Hydraulic Excavator; Wheel	0.3 m3	144	8,071	8,215	4,109	544	4,653	12,868
	Wheel Loader	1.2 m3	246	8,654	8,900	7,019	929	7,948	16,848
	Wheel Loader	0.3 m3	80	3,025	3,105	2,269	300	2,569	5,674
	Water Tank Truck	4000 ltr.	79	2,955	3,034	868	120	988	4,022
	Fuel Tank Truck	4000 ltr.	80	2,961	3,041	882	122	1,004	4,045
	Dump Truck	3.0 ton	133	3,682	3,815	1,469	204	1,673	5,488
	Flat Bed Truck with Crane	3.0 ton	61	3,202	3,263	1,716	127	1,843	5,106
	Dump Loader Truck	12 ton	135	19,799	19,934	3,837	127	3,964	23,898
	Dump Truck	5.0 ton	198	6,087	6,285	2,189	305	2,494	8,779
	Flat Bed Truck	3.0 ton	20	2,773	2,793	563	41	604	3,397
	Portable Crusher/Screening	30-40 t/h	658	22,416	23,074	18,800	2,490	21,290	44,364
	Concrete Mixer	0.5 m3	486	2,433	2,919	5,400	423	5,823	8,742
	Water Pump	200 l/min	18	274	292	188	6	194	486
	Concrete Vibrator	3.3 HP	7	238	245	73	2	75	320
	Asphalt Sprayer	850 ltr.	92	784	876	1,019	142	1,161	2,037

4.2 Unit Construction Cost by Work Type

4.2.1 All Works Except Bridges

The unit construction costs by work type, excluding bridge construction costs, have been estimated using the combination of equipment described in Clause 3.4 and the unit prices already listed. The results are summarized in Table 4-2-1.

Table 4-2-1 UNIT COST BY WORK TYPE EXCEPT BRIDGE WORK

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(Rp)

ITEM	UNIT	LOCAL	FOREIGN	TOTAL
Site Clearance in Light Bush	m2	172	91	263
Subgrade Preparation	m2	22	11	33
Normal Fill	m3	1,770	863	2,633
Fill in Swamp	m3	8,165	267	8,432
Normal Excavation to Spoil	m3	1,035	523	1,558
Cement Stabilizing	m3	12,595	12,368	24,963
Cement Stabilizing	m3	12,595	12,368	24,963
Shoulder	m2	313	146	459
Asphalt Patching	m2	8,785	1,983	10,768
Surface Dressing (Single)	m2	1,143	1,750	2,893
Surface Dressing (Double)	m2	1,618	2,764	4,382
Earth Drain	m	1,158	119	1,277
Earth Drain in Swamp (by machine)	m3	1,308	474	1,782
Pipe Culvert D80cm	m	67,003	49,971	116,974
Masonry Culvert (80x80cm)	m	112,944	39,061	152,005
Retaining Wall and Wing Wall (Timber)	m2	10,646	246	10,892
Retaining Wall and Wing Wall (Masonry)	m3	84,329	10,457	94,786
Gabion Protection	m3	37,098	120	37,218
Manual routine maintenance of road	Km	193,016	7,248	200,264
Routine maintenance of earth road	Km	101,982	37,924	139,906
Routine maintenance of gravel road	Km	789,730	42,664	832,394
Routine maintenance of asphalt road	Km	878,500	198,300	1,076,800

4.2.2 Bridges

The unit construction costs by bridge type including the cost of demolition of existing bridges are shown in Table 4-2-2.

Table 4-2-2 BRIDGE COST

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(Rp)

ITEM	UNIT	LOCAL	FOREIGN	TOTAL
Superstructure (Timber;Span 3m;10T)	m2	41,260	4,083	45,343
Superstructure (Timber;Span 5m;10T)	m2	45,701	4,508	50,209
Superstructure (Timber;Span 8m;10T)	m2	60,529	5,920	66,449
Superstructure (Timber;Span 3m;BM50)	m2	51,160	5,048	56,208
Superstructure (Timber;Span 5m;BM50)	m2	55,849	5,469	61,318
Superstructure (Timber;Span 8m;BM50)	m2	70,831	6,922	77,753
Superstructure (Concrete;Span 3m;BM50)	m2	66,116	106,749	172,865
Superstructure (Concrete;Span 5m;BM50)	m2	69,177	119,370	188,547
Superstructure (Concrete;Span 8m;BM50)	m2	72,228	130,068	202,296
Superstructure (Concrete;Span10m;BM50)	m2	79,561	147,794	227,355
Superstructure (Concrete;Span15m;BM50)	m2	87,736	174,184	261,920
Substructure (Pier;for Timber;10T)	NO	359,571	37,984	397,555
Substructure (Abut;for Timber;10T)	NO	1,209,686	147,329	1,357,015
Substructure (Pier;for Timber;BM50)	NO	528,848	56,225	585,073
Substructure (Abut;for Timber;BM50)	NO	1,337,798	167,422	1,505,220
Substructure (Pier;for Concrete;BM50)	NO	3,093,327	477,264	3,570,591
Substructure (Abut;for Concrete;BM50)	NO	6,531,735	920,351	7,452,086
Demolition of Bridge (Timber->Timber)	m2	12,676	1,417	14,093
Demolition of Bridge (Timber->Concrete)	m2	12,676	1,417	14,093
Demolition of Bridge (Concrete)	m2	138,113	79,667	217,780
Maintenance of Timber Bridge (New)	m2	7,627	1,232	8,859
Maintenance of Concrete Bridge (New)	m2	2,841	3,061	5,902
Maintenance of Timber Bridge (Exist)	m2	7,676	2,459	10,135
Maintenance of Concrete Bridge (Exist)	m2	4,431	2,455	6,886

Chapter 5 RESULTS OF ECONOMIC FEASIBILITY EVALUATION

5.1 Preliminary Screening

The road links to be improved should be effective for development of the Project Area. The road links where improvements were assumed to be inefficient for development of the Project Area were generally screened out using the following cut-off criteria.

(1) Very short roads, less than 2 Km long, which have no connection with the trunk road network.

(2) Roads not connected to the network at any point

(3) Unpreferred roads, due to poor suitability for transportation compared to other existing alternative roads serving the same purpose.

(4) Road in good condition according to the Bina Marga road inventory which lists improvement projects carried out in the last two or three years

(5) Roads with asphalt surface in good condition

(6) Urban roads, except those forming part of a longer route

(7) Roads serving single large organizations rather than the general public

(8) Roads with no inventory data

(9) Kabupaten roads also assigned as provincial roads

The road links to be screened out in Kabupaten Barito Selatan are shown in Table 5-1-1.

Table 5-1-1 ROAD LINKS TO BE SCREENED OUT

KABUPATEN : BARITO SELATAN

CRITERIA NO	ROAD LINK NO
(8)	03,04

5.2 Evaluation

5.2.1 Primary Analysis

The Kabupaten roads were classified by using the future traffic volume on the road links in 1998. The primary analysis of the IRR was carried out using the construction and maintenance costs. Road links where IRRs were more than 10% were defined as feasible links.

Results of primary analysis are shown in Table 5-2-1.

5.2.2 Secondary Analysis

From the infeasible road links evaluated by the primary analysis, road links where the IRRs were between 1% and 10%, i.e. road links which could become feasible if down graded by one rank, in classification were down graded and the costs re-estimated. Using these costs, a secondary analysis of IRR was carried out. Road links where these IRRs were then more than 10% were also defined as feasible links. This reflected that even though the road classification was rather low the road link should be improved.

Results of secondary analysis are shown in Table 5-2-2.

5.2.3 Ranking of Feasible Road Links

From the results of the primary and secondary analysis, road links where the IRRs were more than 10% were selected and their NPVs and B/Cs were estimated. The ranking of feasible road links from the economic evaluation are decided in the order of the NPVs, i.e. the larger the NPV the higher the road link priority as shown in Table 5-2-3.

Table 5-2-1 RESULTS OF PRIMARY ANALYSIS

PROVINCE : KALIMANTAN TENGAH KABUPATEN : BARITO SELATAN

LINK NO	LENGTH	CLASS	IRR(%)	REMARK
1	9 Km	IIIB-1	8.760	Surplus
2	10 Km	IIIB-1	0.078	Surplus
5	4 Km	IIIC	0.078	Surplus
6	8 Km	IIIB-2	0.078	Surplus
7	6 Km	IIIC	0.078	Surplus
8	10 Km	IIIB-2	0.078	Surplus
9	11 Km	IIIB-1	0.078	Surplus
10	3 Km	IIIB-2	0.078	Surplus
11	12 Km	IIIB-2	0.078	Surplus
12	14 Km	IIIB-2	0.078	Surplus
13	7 Km	IIIB-2	0.078	Surplus
14	4 Km	IIIB-2	0.078	Surplus
15	9 Km	IIIB-2	0.078	Surplus
16	18 Km	IIIB-1	0.078	Surplus
17	7 Km	IIIC	0.078	Surplus

Table 5-2-2 RESULTS OF SECONDARY ANALYSIS

PROVINCE : KALIMANTAN TENGAH KABUPATEN : BARITO SELATAN

LINK NO	LENGTH	CLASS	IRR(%)	REMARK
1	9 Km	IIIB-2	9.976	Surplus

Table 5-2-3 RANKING OF FEASIBILITY ROAD LINKS

Nil

Chapter 6 IMPLEMENTATION PROGRAMME

6.1 Implementation Schedule

6.1.1 Project Cost

The total Project Cost for the Kabupaten is composed of the cost of construction and maintenance, supplementation as described later, and workshop, laboratory and survey equipment. The total Project Cost for the Kabupaten is summarized in Table 6-1-1.

Table 6-1-1 TOTAL PROJECT COST (1)

KABUPATEN: Barito Selatan

(Rpx10^6)

COST	FOREIGN CURRENCY	LOCAL CURRENCY	TOTAL
CONSTRUCTION	796	1,426	2,222
MAINTENANCE	20	217	237
SUPPLEMENTATION	392	-	392
WORKSHOP EQUIPMENT & TOOLS	28	-	28
LABORATORY EQUIPMENT	12	-	12
SURVEY EQUIPMENT	5	-	5
TOTAL	1,253	1,643	2,896

The total Project Cost can be divided into costs as shown in Table 6-1-2.

Table 6-1-2 TOTAL PROJECT COST (2)

(Rpx10^6)

COST	FOREIGN CURRENCY	LOCAL CURRENCY	TOTAL
CIVIL WORK	558	1,635	2,193
CONSTRUCTION & MAINTENANCE EQUIPMENT	618	-	618
SPARE PARTS	32	8	40
WORKSHOP/LABORATORY/SURVEY EQUIPMENT	45		
TOTAL	1,253	1,643	2,896

The cost for civil work is composed of the cost of labour and materials, operation cost excluding spare parts, indirect cost and transportation cost of equipment, and ownership cost for existing equipment.

6.1.2 Proposed Road Links

(1) Road Link to be Improved

The road links to be improved were generally selected taking into consideration the following criteria:

(1) Feasible road links
- Feasible road links from the primary evaluation
- Feasible road links from the secondary evaluation

(2) Road links selected from the engineering points of view

(3) Road links selected because of basic human needs.

The road links final proposal for road links to be in the Kabupaten development plan are the 6 links with the total length of 62 km which is 47% of the 132 km total length of Kabupaten roads to be studied. The proposed road links are shown in Table 6-1-3.

Table 6-1-3 ROAD LINKS TO BE IMPROVED

KABUPATEN : BARITO SELATAN

REASON FOR SELECTION	ROAD LINK NO
Feasible	
- Primary	-
- Secondary	-
Engineering Point of View	-
Basic Human Needs	1,8,12,13,14,16

As the table shows there are no feasible road links from the economic evaluation. Therefore the following minimum required road links are selected regardless of any result of economic evaluation from the view point of basic human needs:

- Road links which connect the Kabupaten capital with the Kecamatan capital provided the population density of the Kecamtan is greater than the mean for the Kabupaten; and
- Road links connecting isolated Kabupaten or Kecamatan capital to a trunk road.

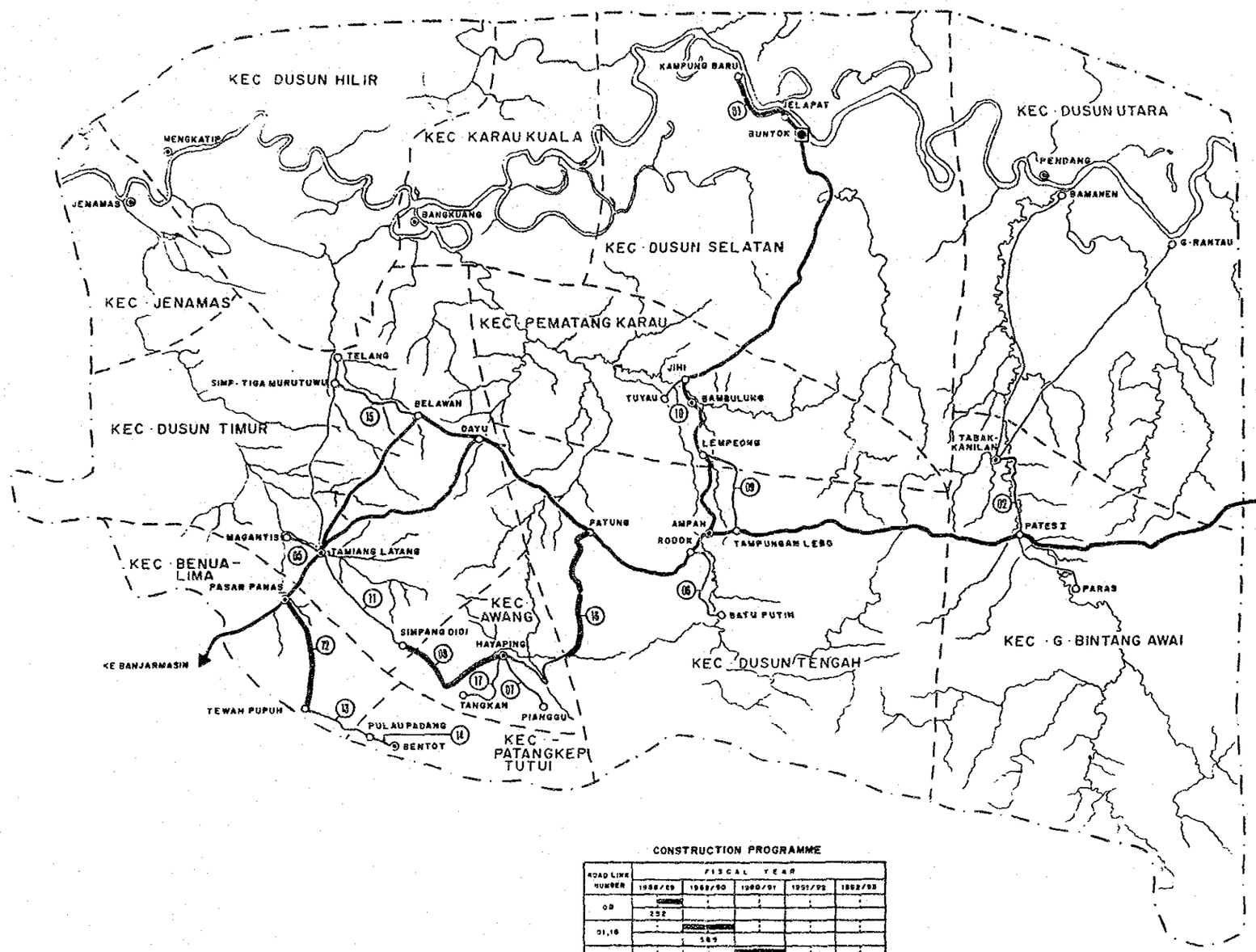
The order of proceeding with the improvement of the proposed road links are decided as shown in Table 6-1-4.

Table 6-1-4 ROAD LINKS TO BE IMPROVED BY YEAR

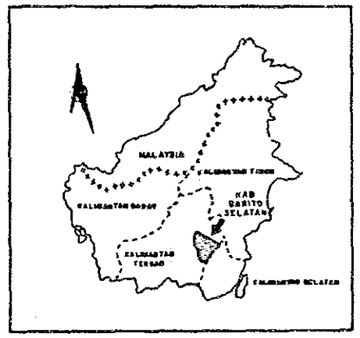
PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

YEAR	LINK NO ( ) : rate
1988 :	8
1989 :	1 (60%), 16 (30%)
1990 :	1 (40%), 12, 16 (30%)
1991 :	13, 14, 16 (40%)
1992 :	

KAB · BARITO SELATAN



LOCATION MAP



LEGEND :

- KABUPATEN CAPITAL
- KECAMATAN CAPITAL
- OTHER CITY
- (3) LINK NUMBER
- PROVINCIAL BOUNDARY
- KABUPATEN BOUNDARY
- KECAMATAN BOUNDARY
- NATIONAL ROAD
- PROVINCIAL ROAD
- KABUPATEN ROAD
- VILLAGE ROAD
- RIVER

SCALE :

0 5 10 15 Km

CONSTRUCTION PROGRAMME

ROAD LINK NUMBER	FISCAL YEAR 1988/89	1989/90	1990/91	1991/92	1992/93
08	252				
01,16		585			
01,12,18			742		
13,14,15				645	
TOTAL COST (10^6 Rp)	252	585	742	645	

THE FEASIBILITY STUDY OF THE LOCAL ROAD DEVELOPMENT IN THE REPUBLIC OF INDONESIA

TITLE : CONSTRUCTION PROGRAMME

SOURCE:	SCALE:	PROVINCE: KALIMANTAN TENGAH
DIREKTORAT JENDERAL CIPTA KARYA	AS SHOWN	KABUPATEN: BARITO SELATAN

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(2) Road Links to Be Maintained

It is desirable that all Kabupaten roads are maintained. However, because of the limited budget it is inevitable that some road links in the Kabupatens will be left without maintenance for the time being. The budget should be used for those which are effective in producing more useful development of the Kabupaten through the road development project. The road links to be maintained are finally proposed as shown in Table 6-1-5.

Table 6-1-5 ROAD LINKS TO BE MAINTAINED

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(1000Rp)

LINK NO	LENGTH (Km)	BA (%)	SD (%)	RU (%)	RB (%)	ASPHAL (Km)	GRAVEL (Km)	EARTH (Km)	TH NO	AREA (m2)	RC NO	AREA (m2)	BRIDGE COST	LOCAL COST	FOREIGN COST	TOTAL COST
2	10	10.0	10.0	78.0	2.0	0	10	0	2	190.00	0	0.00	1,926	11,286	966	12,252
5	4	0.0	35.0	46.3	18.8	0	2	2	1	12.00	0	0.00	122	2,648	220	2,868
8	10	0.0	8.1	82.9	9.0	0	8	2	6	174.00	0	0.00	1,763	9,788	918	10,706
11	12	0.0	50.0	24.2	25.8	0	12	0	3	104.00	0	0.00	1,054	12,591	855	13,446
15	9	0.0	60.6	26.1	13.3	0	7	2	0	0.00	0	0.00	0	7,469	440	7,909
17	7	1.4	72.9	20.0	5.7	0	7	0	9	377.50	0	0.00	3,826	9,777	1,278	11,055
SUM	52					0	46	6	21	857.50	0	0.00	8,691	53,559	4,677	58,236

6.1.3 Annual Construction and Maintenance Cost

The annual allocation of the total construction and maintenance cost in the four years programme for Kabupaten Barito Selatan is finally recommended as shown in Tables 6-1-6 (1), (2) and (3) for the construction, maintenance and total respectively.

The proposed construction cost is Rp 2,222 x 10^6 and maintenance cost is Rp 237 x 10^6 which is approximately 10% of the total expenditure.

Table 6-1-6 (1) CONSTRUCTION AND MAINTENANCE COST
(CONSTRUCTION)

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(UNIT : 1000Rp)

ITEM	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)	
LOCAL CURRENCY :	150,990	369,990	463,464	425,353	0	1,409,797	(63.4%)
Ownership Cost	1,464	2,790	3,883	3,423	0	11,560	(0.8%)
Operation Cost	49,309	103,349	136,245	124,085	0	412,988	(29.3%)
Material Cost	52,258	166,276	181,802	175,827	0	576,163	(40.9%)
Labour Cost	28,265	49,315	81,082	66,537	0	225,199	(16.0%)
Contingency	19,694	48,260	60,452	55,481	0	183,887	(13.0%)
FOREIGN CURRENCY :	101,439	215,572	277,311	218,096	0	812,418	(36.6%)
Ownership Cost	27,655	55,753	74,496	67,744	0	225,648	(27.8%)
Operation Cost	3,779	7,496	10,109	9,169	0	30,553	(3.8%)
Material Cost	56,774	124,205	156,535	112,736	0	450,250	(55.4%)
Labour Cost	0	0	0	0	0	0	(0.0%)
Contingency	13,231	28,118	36,171	28,447	0	105,967	(13.0%)
TOTAL COST :	252,430	585,562	740,775	643,449	0	2,222,216	
Ownership Cost	29,119	58,543	78,379	71,167	0	237,208	(10.7%)
Operation Cost	53,088	110,845	146,354	133,254	0	443,541	(20.0%)
Material Cost	109,032	290,481	338,337	288,563	0	1,026,413	(46.2%)
Labour Cost	28,265	49,315	81,082	66,537	0	225,199	(10.1%)
Contingency	32,926	76,378	96,623	83,928	0	289,855	(13.0%)

(Contingency : 15%)

Table 6-1-6 (2) CONSTRUCTION AND MAINTENANCE COST

(MAINTENANCE)

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(UNIT : 1000Rp)

ITEM	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)	
LOCAL CURRENCY :	24,325	54,921	54,921	82,738	0	216,905	(91.5%)
Ownership Cost	64	141	141	253	0	599	(0.3%)
Operation Cost	4,113	9,137	9,137	14,254	0	36,641	(16.9%)
Material Cost	14,625	33,397	33,397	48,211	0	129,630	(59.8%)
Labour Cost	5,523	12,246	12,246	20,020	0	50,035	(23.1%)
FOREIGN CURRENCY :	2,107	4,684	4,684	8,646	0	20,121	(8.5%)
Ownership Cost	1,803	4,007	4,007	6,343	0	16,160	(80.3%)
Operation Cost	176	391	391	610	0	1,568	(7.8%)
Material Cost	128	286	286	1,693	0	2,393	(11.9%)
Labour Cost	0	0	0	0	0	0	(0.0%)
TOTAL COST :	26,432	59,605	59,605	91,384	0	237,026	
Ownership Cost	1,867	4,148	4,148	6,596	0	16,759	(7.1%)
Operation Cost	4,289	9,528	9,528	14,864	0	38,209	(16.1%)
Material Cost	14,753	33,683	33,683	49,904	0	132,023	(55.7%)
Labour Cost	5,523	12,246	12,246	20,020	0	50,035	(21.1%)

Table 6-1-6 (3) CONSTRUCTION AND MAINTENANCE COST

(TOTAL)

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(UNIT : 1000Rp)

ITEM	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)	
LOCAL CURRENCY :	175,315	424,911	518,385	508,091	0	1,626,702	(66.1%)
Ownership Cost	1,528	2,931	4,024	3,676	0	12,159	(0.7%)
Operation Cost	53,422	112,486	145,382	138,339	0	449,629	(27.6%)
Material Cost	66,883	199,673	215,199	224,038	0	705,793	(43.4%)
Labour Cost	33,788	61,561	93,328	86,557	0	275,234	(16.9%)
Contingency	19,694	48,260	60,452	55,481	0	183,887	(11.3%)
FOREIGN CURRENCY :	103,546	220,256	281,995	226,742	0	832,539	(33.9%)
Ownership Cost	29,458	59,760	78,503	74,087	0	241,808	(29.0%)
Operation Cost	3,955	7,887	10,500	9,779	0	32,121	(3.9%)
Material Cost	56,902	124,491	156,821	114,429	0	452,643	(54.4%)
Labour Cost	0	0	0	0	0	0	(0.0%)
Contingency	13,231	28,118	36,171	28,447	0	105,967	(12.7%)
TOTAL COST :	278,862	645,167	800,380	734,833	0	2,459,242	
Ownership Cost	30,986	62,691	82,527	77,763	0	253,967	(10.3%)
Operation Cost	57,377	120,373	155,882	148,118	0	481,750	(19.6%)
Material Cost	123,785	324,164	372,020	338,467	0	1,158,436	(47.1%)
Labour Cost	33,788	61,561	93,328	86,557	0	275,234	(11.2%)
Contingency	32,926	76,378	96,623	83,928	0	289,855	(11.8%)

(Contingency : 15%)

6.1.4 Construction and Maintenance Equipment Cost

(1) Required Number of Equipment

The required numbers of construction equipment for Kabupaten Barito Selatan are estimated from the annual proposed construction quantities as shown in Table 6-1-7.

The proposed numbers of equipment to be purchased are finally decided considering the following number of existing equipment in the Kabupaten which are available for the Project.

- 1-Steel Roller
- 1-Hand-guided Vibratory Roller
- 1-Asphalt Sprayer

The proposed numbers of maintenance equipment have been decided as shown below from the proposed annual maintenance volume taking into account the capacity of the proposed maintenance gangs.

a. Equipment for Road Maintenance

- 1-Flat Bed Truck 3 Ton

b. Equipment for Bridge Maintenance

- 1-Flat Bed Truck with Grane 3 Ton

(2) Equipment Cost

The proposed construction and maintenance equipment and their purchase costs are shown in Table 6-1-8. In the Project the supplementation cost or equipment cost supplemented is the difference between the purchase cost for newly supplied equipment and the depreciated value.

This comes about because full depreciation of the supplied equipment would not be completed within the Project Period of 5 years.

Table 6-1-7 REQUIRED NUMBER OF EQUIPMENT

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

EQUIPMENT NAME	WORKABLE	EXISTING	(1988)	(1989)	(1990)	(1991)	(1992)
Bulldozer	250	0	0.20	0.30	0.45	0.39	0.00
Bulldozer/Ripper	250	0	0.20	0.22	0.40	0.33	0.00
Swamp Bulldozer	250	0	0.03	0.23	0.19	0.25	0.00
Motor Grader	250	0	0.52	0.71	1.16	0.89	0.00
Road Stabilizer	250	0	0.20	0.30	0.45	0.39	0.00
Hand-guide Vib. Roller	250	2	0.03	0.05	0.09	0.14	0.00
Tire Roller	250	0	0.00	0.12	0.08	0.00	0.00
Vibratory Roller (D&I)	250	0	0.46	0.82	1.15	0.99	0.00
Hydraulic Excavator; Wheel	250	0	0.36	2.43	2.04	2.64	0.00
Wheel Loader	250	0	0.49	0.66	1.07	0.90	0.00
Water Tank Truck	250	0	0.32	0.64	0.83	0.77	0.00
Dump Truck	250	0	3.81	6.35	9.76	7.99	0.00
Flat Bed Truck with Crane	250	0	0.02	0.04	0.08	0.14	0.00
Flat Bed Truck	250	0	0.30	0.61	0.80	0.62	0.00
Concrete Mixer	250	0	0.01	0.01	0.01	0.01	0.00
Water Pump	250	0	0.01	0.01	0.01	0.01	0.00
Concrete Vibrator	250	0	0.01	0.01	0.01	0.01	0.00
Asphalt Sprayer	250	1	0.00	0.12	0.08	0.00	0.00

NOTE WORKABLE : workable days in a year
EXISTING : number of existing equipment

Table 6-1-8 EQUIPMENT PURCHASE COST

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(1000 Rp)

EQUIPMENT NAME	CLASS	CIF (JAKARTA)	PURCHASE NO.	PURCHASE COST
Bulldozer	90 HP	49,150	1	49,150
Bulldozer/Ripper	90 HP	53,000	-	-
Swamp Bulldozer	90 HP	52,850	1	52,850
Swamp Bulldozer	65 HP	40,500	-	-
Motor Grader	75 HP	47,800	1	47,800
Road Stabilizer	W=1850 mm	85,950	1	85,950
Hand-guide Vib. Roller	1000 Kg	8,500	-	-
Tire Roller	8-15 ton	31,070	1	31,070
Vibratory Roller (D&T)	4 ton	29,000	-	-
Vibratory Roller	4 ton	29,000	-	-
Rough Terrain Crane	10 ton	100,400	-	-
Hydraulic Excavator; Wheel	0.3 m3	41,100	2	82,200
Wheel Loader	1.2 m3	70,200	1	70,200
Water Tank Truck	4000 ltr.	12,750	1	12,750
Dump Truck	3.0 ton	14,700	8	117,600
Dump Loader Truck	12 ton	56,300	-	-
Flat Bed Truck with Crane	3.0 ton	25,190	1	25,190
Flat Bed Truck	3.0 ton	11,275	1	11,275
Portable Crusher/Screening	30-40 t/h	188,000	-	-
Concrete Mixer	0.5 m3	18,000	-	-
Water Pump	200 l/min	630	-	-
Concrete Vibrator	3.3 HP	740	-	-
Asphalt Sprayer	850 ltr.	10,200	-	-
Service Car	3 ton	11,600	1	11,600
4 Wheel Drive Vehicle	70 HP	17,500	1	17,500
Motorcycle	100 cc	1,100	3	3,300

PURCHASE COST TOTAL	618,435
OWNERSHIP COST (FOREIGN)	226,259
EQUIPMENT COST SUPPLEMENTED	392,176

NOTE : OWNERSHIP COST (FOREIGN) for Existing Equipment

Hand-guide Vib. Roller	487
Vibratory Roller (D&T)	14,757
Asphalt Sprayer	305
TOTAL	15,549

6.1.5 Other Costs

Cost other items includes the costs of workshop equipment and tools, laboratory test equipment and survey equipment which are recommended in Sub-Clause 3.5. These total costs are summarized in Table 6-1-1.

6.1.6 Quantities by Work Type

The annual construction and maintenance quantities for all proposed road links are shown in Table 6-1-9.

Table 6-1-9 CONSTRUCTION QUANTITIES FOR ALL PROPOSED LINKS

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

I T E M	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
Site Clearance in Light Bush	m2	0.00	0.00	0.00	8000.00	0.00	8000.00
Subgrade Preparation	m2	29720.00	91500.00	77830.00	96840.00	0.00	295890.00
Normal Fill	m3	0.00	300.00	200.00	0.00	0.00	500.00
Fill in Swamp	m3	1044.00	10130.64	8375.64	10908.02	0.00	30458.30
Normal Excavation to Spoil	m3	1548.00	3005.40	2362.20	6511.40	0.00	13427.00
Cement Stabilizing	m3	3363.60	7441.20	9031.60	8770.00	0.00	28606.40
Cement Stabilizing	m3	2400.00	1512.00	4368.00	2640.00	0.00	10920.00
Shoulder	m2	60000.00	54000.00	127200.00	68800.00	0.00	310000.00
Asphalt Patching	m2	0.00	0.00	0.00	0.00	0.00	0.00
Surface Dressing (Single)	m2	0.00	21600.00	14400.00	0.00	0.00	36000.00
Surface Dressing (Double)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Earth Drain	m	14860.00	7956.00	34956.00	13208.00	0.00	70980.00
Earth Drain in Swamp (by machine)	m3	7200.00	48600.00	40800.00	52800.00	0.00	149400.00
Pipe Culvert D80cm	m	29.00	16.20	52.60	31.20	0.00	129.00
Masonry Culvert (80x80cm)	m	0.00	0.00	0.00	0.00	0.00	0.00
Retaining Wall and Wing Wall (Timber)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Retaining Wall and Wing Wall (Masonry)	m3	6.40	0.96	0.96	4.48	0.00	12.80
Gabion Protection	m3	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber;Span 3m;10T)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber;Span 5m;10T)	m2	0.00	0.00	20.00	40.00	0.00	60.00
Superstructure (Timber;Span 8m;10T)	m2	0.00	33.60	28.80	109.60	0.00	172.00
Superstructure (Timber;Span 3m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber;Span 5m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Timber;Span 8m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete;Span 3m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete;Span 5m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete;Span 8m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete;Span10m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Superstructure (Concrete;Span15m;BM50)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Pier;for Timber;10T)	NO	0.00	0.00	0.00	2.00	0.00	2.00
Substructure (Abut;for Timber;10T)	NO	0.00	2.40	4.00	7.60	0.00	14.00
Substructure (Pier;for Timber;BM50)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Abut;for Timber;BM50)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Pier;for Concrete;BM50)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Substructure (Abut;for Concrete;BM50)	NO	0.00	0.00	0.00	0.00	0.00	0.00
Demolition of Bridge (Timber->Timber)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Demolition of Bridge (Timber->Concrete)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Demolition of Bridge (Concrete)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Manual routine maintenance of road	Km	23.50	52.00	52.00	75.00	0.00	202.50
Routine maintenance of earth road	Km	2.50	4.00	4.00	4.00	0.00	14.50
Routine maintenance of gravel road	Km	21.00	48.00	48.00	62.00	0.00	179.00
Routine maintenance of asphalt road	Km	0.00	0.00	0.00	9.00	0.00	9.00
Maintenance of Timber Bridge (New)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Maintenance of Concrete Bridge (New)	m2	0.00	0.00	0.00	0.00	0.00	0.00
Maintenance of Timber Bridge (Exist)	m2	305.25	857.50	857.50	1432.50	0.00	3532.75
Maintenance of Concrete Bridge (Exist)	m2	0.00	0.00	0.00	0.00	0.00	0.00

6.2 Organization and Construction System

6.2.1 Organization

The Bupati as head of the Kabupaten has been authorized by Law No. 13, 1980 as an official responsible for the Local Road Development Project implementation. This means that the DPUK is considered as a responsible agency for the actual execution of the Project.

According to instruction letter dated June 24, 1982 Ref. No. 620/975-/BANGDA, the Project Manager appointed by the Bupati will be responsible for the operation and maintenance of the equipment. Accordingly the Equipment Coordinator appointed from the staff of the Regional Public Works (Kantor Wilayah) by Bina Marga as a coordinator between the Governor and the Bupati will be responsible for delivery, effectual utilization and maintenance of the equipment.

The standard organization of DPUK consists of a minimum of four sections, i.e. Road Section, Housing and City Planning Section, Irrigation Section and Administration Section. For execution of the Project it is strongly recommended that the structural organization of DPUK is established. It will be necessary not only to organize new sections but also to reorganize the current structure through a review of the roles and responsibilities of each inter-related section.

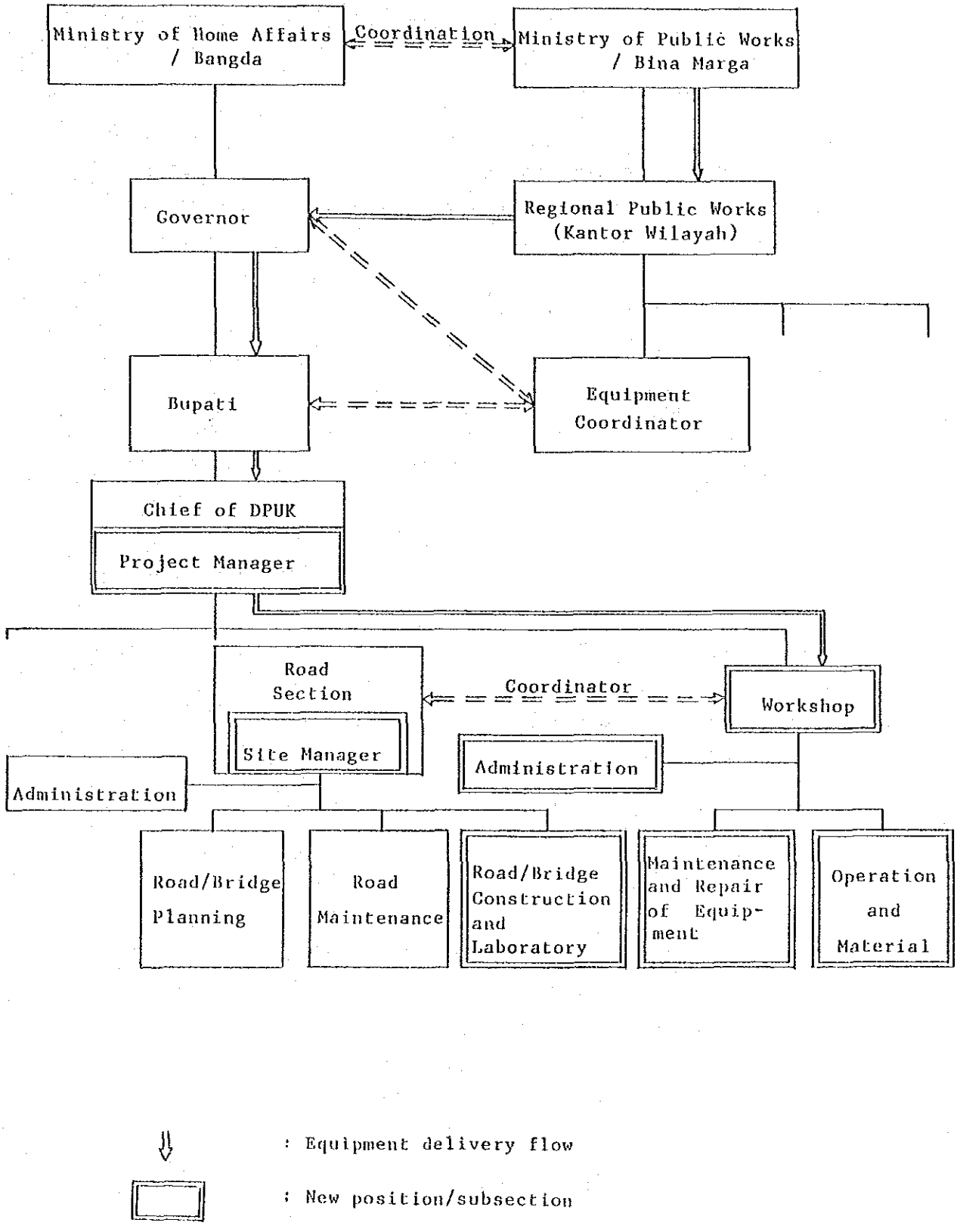
It is recommended that the workshop is newly organized to consist of three sub-sections, i.e. maintenance and repair of equipment, operation and materials, and administration to execute the main tasks described in Clause 3.5.

The sub-section of laboratory would be under the relevant Road Section. The proposed organization is shown in Fig. 6-2-1.

6.2.2 Construction System

For the construction of Kabupaten roads with a ten year effective design life, it has been recommended in Clause 3.4 that the equipment intensive method should be adopted for earth work and pavement work with the exception of surface dressing.

Fig. 6-2-1 PROPOSED ORGANIZATION



Current road construction in the Kabupatens is obliged to rely upon the traditional labour intensive method. It is therefore assumed that both the DPUK and the local contractors in the Kabupatens do not have sufficient experience and technique for the equipment intensive method of road construction.

For realization of the Local Road Development Project the GOI has ensured availability of the required human resources of DPUK and intends to conduct training programmes for those human resources as described in Clause 8.3 of the Main Report. This means that the GOI intends the Kabupatens to have the ability to execute the Project by force account (Swakelola).

It should be recognized from the experiences in the first local road project, which was assisted by OECF, ADB and IBRD, that because of their poor construction management and traditional labour intensive methods most of the road construction by local contractors could not be completed within the contract periods. Therefore execution of the road improvement by force account is desirable as recommended from their experience by the consultants for the first local road project.

It is strongly recommended that except for labourers the staff of the force account team should not be hired by the day as it would then not be able to consolidate the foundations for development of self reliability.

However, it will be very difficult to execute all the Projects by force account because of the need for many Kabupaten staff. The GOI has emphasized the need to promote the employment of local weak contractors in order to up-grade their capability in the road project schemes within the Fourth Five-Year Plan (REPELITA)

Taking into consideration the conditions mentioned above it is strongly recommended that the DPUK is obliged to lend some equipment with skilled operators to the local contractors in the Kabupatens for the execution of a part of the road improvement works.

The types of work executed only by force account are recommended as follows:

- Routine maintenance work for the Kabupaten roads
- Laboratory tests
- Production of crushed stone
- Technical service for the equipment

APPENDIX

INPUT DATA

Appendix A-1 FOR ESTIMATION OF THE PRODUCER'S SURPLUS BENEFIT

PRV. : KALIMANTAN TENGAH KAB. : BARITO SELATAN SURVEY YEAR : 1983

Code No.	KECAMATAN NAME	CULTIVATED AREA : (PA)	YIELD RATE : (Y)	FARMER'S POPULATION : (AP)	CIRCULATED COMMODITY : (PG)
01	JENAMAS	37	2.2	790	9,000
02	DUSUN HILIR	258	2.1	840	6,000
03	KARAU KUALA	158	1.3	720	12,000
04	DUSUN SELATAN	304	1.9	3,750	28,000
05	DUSUN UTARA	426	1.8	1,050	11,000
06	GUNUNG BATU AWAI	1,623	1.8	750	10,000
07	DUSUN TIMUR	1,340	0.8	2,070	15,000
08	BENUA LIMA	398	0.8	990	13,000
09	PATANGKEP TUTUI	979	0.9	500	15,000
10	AWANG	1,107	0.9	530	11,000
11	DUSUN TENGAH	4,573	1.8	4,400	14,000
12	PEMATANG KARAU	2,649	2.0	1,150	12,000

	r_1	r_2	r_3	r_4
ANNUAL AVERAGE % GROWTH RATE	1.2	2.6	3.6	5.6

FARMER'S CONSUMPTION : (Cp)	NON-AGRO REQUIRMENT : (NG)
0.06 Ton/head/year	0.11 Ton/Ton

	SEDAN	BUS	TRUCK	MOTOR CYCLE
RATE OF EACH VEHICLE TYPE %	7.89	3.29	17.54	71.27

AVERAGE FREIGHT TONAGE	0.7 Ton/Truck

Appendix A-2 Engineering Data

ROAD LINK DATA

PROVINCE : Kalimantan Tengah

KABUPATEN: Barito Selatan

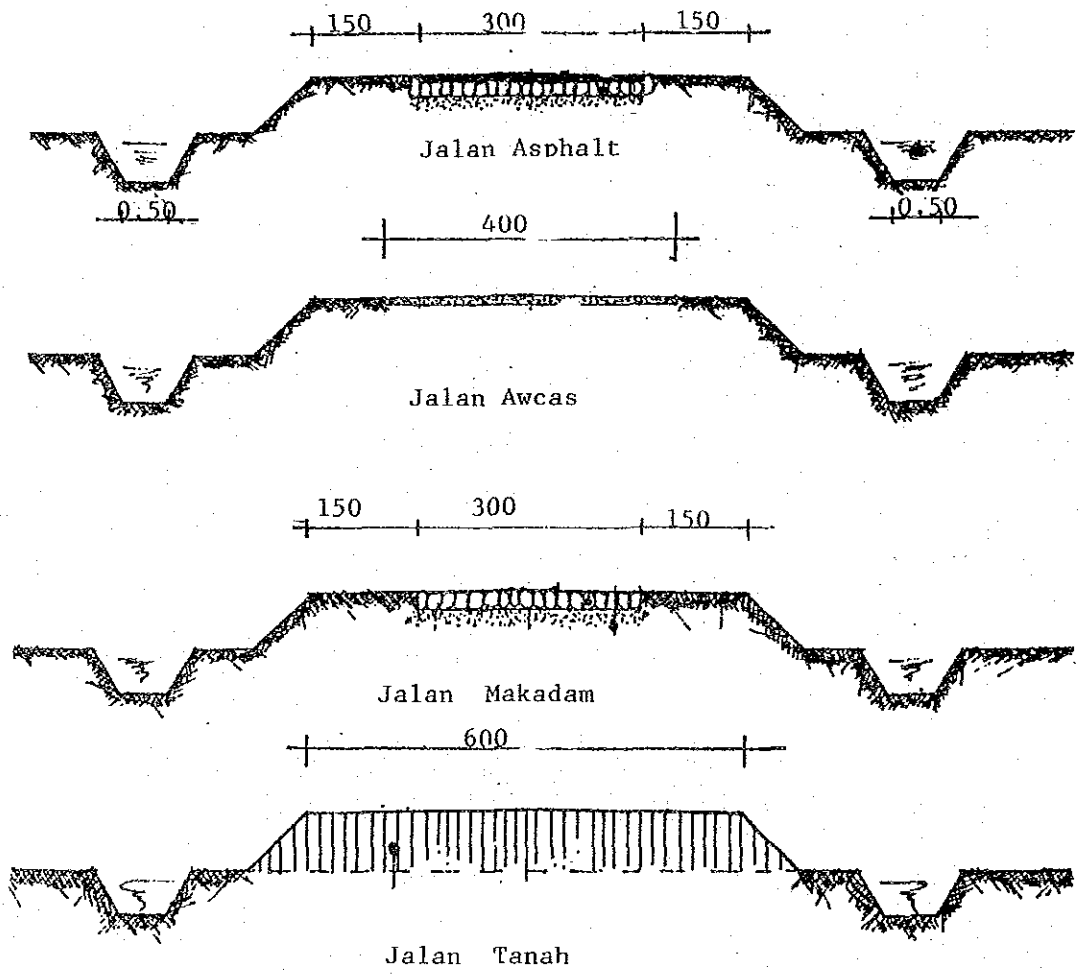
LINK NO.	BEGINNING POINT (DESA NAME)	END POINT (DESA NAME)	LENGTH (KM)	THROUGH THE KEC. NAME & LENGTH		REMARKS
				KEC. NAME	LENGTH (KM)	
01	Jelapat	Kampung Baru	9	Dusun Selatan	9	
02	Tabak Kanilan	Pates I	10	Gn. Bintang Awai	10	
03						
04						
05	Tamiang Layang	Magantis	4	Dusun Timur	4	
06	Rodok	Batu Putih	8	Dusun Tengah	8	
07	Hayaping	Pianggu	6	Awang	6	
08	Simpang Didi	Hayaping	10	Dusun Timur Awang	1 9	
09	Tumpungan Lebo	Lempeong	11	Dusun Tengah Ptg.Karau	8 3	
10	J i n i	Tuyau	3	Pematang Karau	3	
11	Tamiang Layang	Simpang Didi	12	Dusun Timur	12	
12	Tewah Pupuh	Pasar Panas	14	Benua Lima	14	
13	Pulau Padang	Tewah Pupuh	7	Benua Lima Ptk.Tutui	5.5 1.5	
14	Bentot	Pulau Padang	4	Petangkep Tutui	4	
15	Simp. Tiga Murutuwu	Belawan	9	Dusun Timur	9	
16	Patung	Hayaping	18	Awang Dusun Tengah	8 10	
17	Hayaping	Tangkan	7	Awang	7	

Please note the priority No. in the Remarks of this list for each links No. according to the each Kabupaten's development plan.

What Kind of Design Criteria has being applied for the new road construction and the improvement for the Kabupaten Road ?
Kriteria Perencanaan yang dipakai pada program penanganan jalan Kabupaten, baik untuk jalan lama maupun pembangunan baru.

Please draw the Typical Cross Section of the Kabupaten Road.
Buat gambar dan penjelasan dari: Typical cross section yang dipakai pada program penanganan jalan selama ini (baik untuk jalan lama, maupun pembangunan baru)

TYPICAL CROSS SECTION.



PROPINSI: Kalimantan Tengah E-03-(1)

KABUPATEN:Barito Selatan LOCATION AND COSTS OF THE KABUPATEN ROADS CONSTRUCTED OR INPROVED IN 1980/1981

Biaya konstruksi penanganan jalan dan jembatan Kabupaten thn.1980/1981

(Dalam Jutaan Rupiah)

LINK NO : Nomor Ruas	LOCATION From - To (dari - ke)	Lebar perkerasan(m) / Lebar Jembatan	Type perkerasan / Type Jembatan	LENGTH Panjang (KM)	COSTS Harga (Rp 10^6)	REMARKS Keterangan
1	Simp.Didi-Hayaping-Tangkan	34 m 4.5 m	Gravel Timber	14 80 m	99,560	Inp.Jalan
2	Jelapat - Baru	4 m -	Gravel -	3.3	25,990	Inp.DatiII
3	Patas I - T. Kanilan	4 -	Gravel -	8.3	12,800	"
4	Jalan Dalam Kota Buntok (Pemeliharaan)	3 -	Asphalt -	5	4,000	"

* PAVEMENT TYPE : Pls note the appropriate No. below.

1. : Asphalt surface / penetrasi macadam
2. : Asphalt seal / pelaburan aspal
3. : Gravel / kerikil
4. : Gravel /AWCAS / kerikil / japat

PROPINSI: Kalimantan Tengah

KABUPATEN: Barito Selatan LOCATION AND COSTS OF THE KABUPATEN ROADS CONSTRUCTED OR INPROVED IN 1981/1982

Biaya konstruksi penanganan jalan dan jembatan Kabupaten thn. 1981/1982

(Dalam Jutaan Rupiah)

LINK NO : Nomor Ruas	L O C A T I O N From - To (dari - ke)	Lebar perkerasan(m) / Lebar Jembatan	Type perkerasan / Type Jembatan	LENGTH Panjang (KM)	COSTS Harga (Rp 10^6)	REMARKS Keterangan
1	Buntok-Pamait-Sanggu	3 m -	Asphalt -	16.5	108,640	Inp.Jalan
2	Ps. Panas-Tw. Pupuh - Bentot	4 m -	Gravel -	17	19,470	"
3	Jelapat - Baru	4 m	Gravel	7.7	54,320	"
4	T.Layang-Dorong-Simp.Didi	4 m 4.5 m	Gravel Timber	16 41 m	184,540	"
5	Jihi - Tuyau	4 m 4.5 m	Gravel Timber	3 56 m	71,304	"
6	Pararapak-Danau Jutuh	4 m 4.5 m	Gravel Timber	3.68 24 m	63,315	"
7	Jalan Dalam Kota Buntok	3 m	Asphalt	10.8	59,900	"

* PAVEMENT TYPE : Pls note the appropriate No. below.

1. : Asphalt surface / penetrasi macadam
2. : Asphalt seal / pelaburan aspal
3. : Gravel / kerikil
4. : Gravel /AWCAS / kerikil / japat

PROPINSI: Kalimantan Tengah

E-03-(3)

KABUPATEN: Barito Selatan LOCATION AND COSTS OF THE KABUPATEN ROADS CONSTRUCTED OR INPROVED IN 1982/1983

Biaya konstruksi penanganan jalan dan jembatan Kabupaten thn. 1982/1983

(Dalam Jutaan Rupiah)

LINK NO.: Nomor Ruas	LOCATION From - To (dari - ke)	Lebar perkerasan(m) / Lebar Jembatan	Type perkerasan / Type Jembatan	LENGTH Panjang (KM)	COSTS Harga (Rp 10^6)	REMARKS Keterangan
1	Jelapat - Baru	- 4.5 m	- Timber	71 m	70,322	Inp.Jalan
2	Patas I - Kanilan	4 m 4.5 m	Asphalt Timber	8.85 20 m	67,513	"
3	Ps.Panas-Tewah Pupuh	- 4.5 m	- Timber	40 m	29,847	"
4	Bentot-Pulau Padang-Tewah Pupuh	4 m 4.5 m	Asphalt Timber	1.9 51 m	71,923	"
5	Hayaping - Patung	4 m 4.5 m	Asphalt Timber	28.3 81 m	219,322	"
6	Simp.Tiga Balawa-M. Tuwu	3 m -	Asphalt -	9	70,000	"
7	Jalan Dalam Kota Buntok	3 m 4.5 m	Asphalt Timber	2.8 10 m	79,970	"

* PAVEMENT TYPE : Pls note the appropriate No. below.

1. : Asphalt surface / penetrasi macadam
2. : Asphalt seal / pelaburan aspal
3. : Gravel / kerikil
4. : Gravel /AWCAS / kerikil / japat

PROPINSI: Kalimantan Tengah E-03-(4)

KABUPATEN: Barito Selatan LOCATION AND COSTS OF THE KABUPATEN ROADS CONSTRUCTED OR INPROVED IN 1983/1984

Biaya konstruksi penanganan jalan dan jembatan Kabupaten thn. 1983/1984

(Dalam Jutaan Rupiah)

LINK NO Nomor Ruas	L O C A T I O N From - To (dari - ke)	Lebar perkerasan(m) / Lebar Jembatan	Type perkerasan / Type Jembatan	LENGTH Panjang (KM)	COSTS Harga (Rp 10^6)	REMARKS Keterangan
1	Tangkan-Jln. Pertamina.	4 m / -	Awcas / -	7.4	52,529	Inp.Jalan
2	Ampah - Liang ayah	4 m / -	Gravel / -	5	41,114	"
3	Dalam Kota Bambulung	- / 4.5 m	- / Timber	36 m	34,826	"
4	Hayaping - Liang Saragih	4 m / -	Gravel / -	6	54,174	"
5	Simp.Empat Didi-Hayaping	4 m / -	Gravel / -	13	124,528	"
6	Ampah-Lebo-Lampeong	4 m / 4.5 m	Gravel / Timber	11.5 / 15 m	79,326	"
7	Buntok-Desa Kaladan	4 m / -	Gravel / -	6	48,054	"
8	Hayaping - Patung	- / 4.5 m	- / Timber	45	40,630	"
9	Simp.Jaya Karsa-Komplek Pelajar	3 m / -	Asphalt / -	0.7	20,316	"
10	Jalan Dalam Kota Bambulung	4 m / -	Gravel / -	3	25,000	"
11	Jalan Dalam Kota Mengkatip	4 m / -	Gravel / -	4	25,000	"
12	Jalan Dalam Kota Jenamas	4 m / -	Gravel / -	3	25,000	"
13	Jalan Dalam Kota Buntok	3 m / -	Asphalt / -	2.5	81,581	"

* PAVEMENT TYPE : Pls note the appropriate No. below.

1. : Asphalt surface / penetrasi macadam
2. : Asphalt seal / pelaburan aspal
3. : Gravel / kerikil
4. : Gravel /AWCAS / kerikil / japat

PROPINSI: Kalimantan Tengah

E-03-(5)

KABUPATEN: Barito Selatan LOCATION AND COSTS OF THE KABUPATEN ROADS CONSTRUCTED OR INPROVED IN 1984/1985

Biaya konstruksi penanganan jalan dan jembatan Kabupaten thn. 1984/1985

(Dalam Jutaan Rupiah)

LINK NO Nomor Ruas	LOCATION From - To (dari - ke)	Lebar perkerasan(m) / Lebar Jembatan	Type perkerasan / Type Jembatan	LENGTH Panjang (KM)	COSTS Harga (Rp 10^6)	REMARKS Keterangan
I	Bentot - Komp.Kecamatan	4 m / -	Gravel / -	4.9	56,600	Inp.Jalan
2	Bentot-Tw. Pupuh -P.Panas	4 m / 4.5 m	Asphalt / Timber	2 / 18 m	55,650	"
3	Ampah-M.Baki-Matabu-Baruh Rintis	4 m / -	Gravel / -	3.9	64,000	"
4	Jelapat - Baru	4 m / -	Awcas / -	8	70,000	"
5	Buntok - Asam	4 m / -	Gravel / -	14.4	225,000	"
6	Jl. Dalam Kota Ampah	3 m / -	Asphalt / -	3.15	45,000	"
7	Jl.Dalam Kota T. Layang	3 m / -	Asphalt / -	3	36,000	"
8	Jl. Dalam Kota Buntok	4 m / 4.5 m	Gravel / Timber	1.92 / 12 m	53,797	"
9	Jl. Dalam Kota Buntok (Pemeliharaan)	3 m / -	Asphalt / -		42,000	"

* PAVEMENT TYPE : Pls note the appropriate No. below.

1. : Asphalt surface / penetrasi macadam
2. : Asphalt seal / pelaburan aspal
3. : Gravel / kerikil
4. : Gravel /AWCAS / kerikil / japat

PROPINSI : Kalimantan Tengah

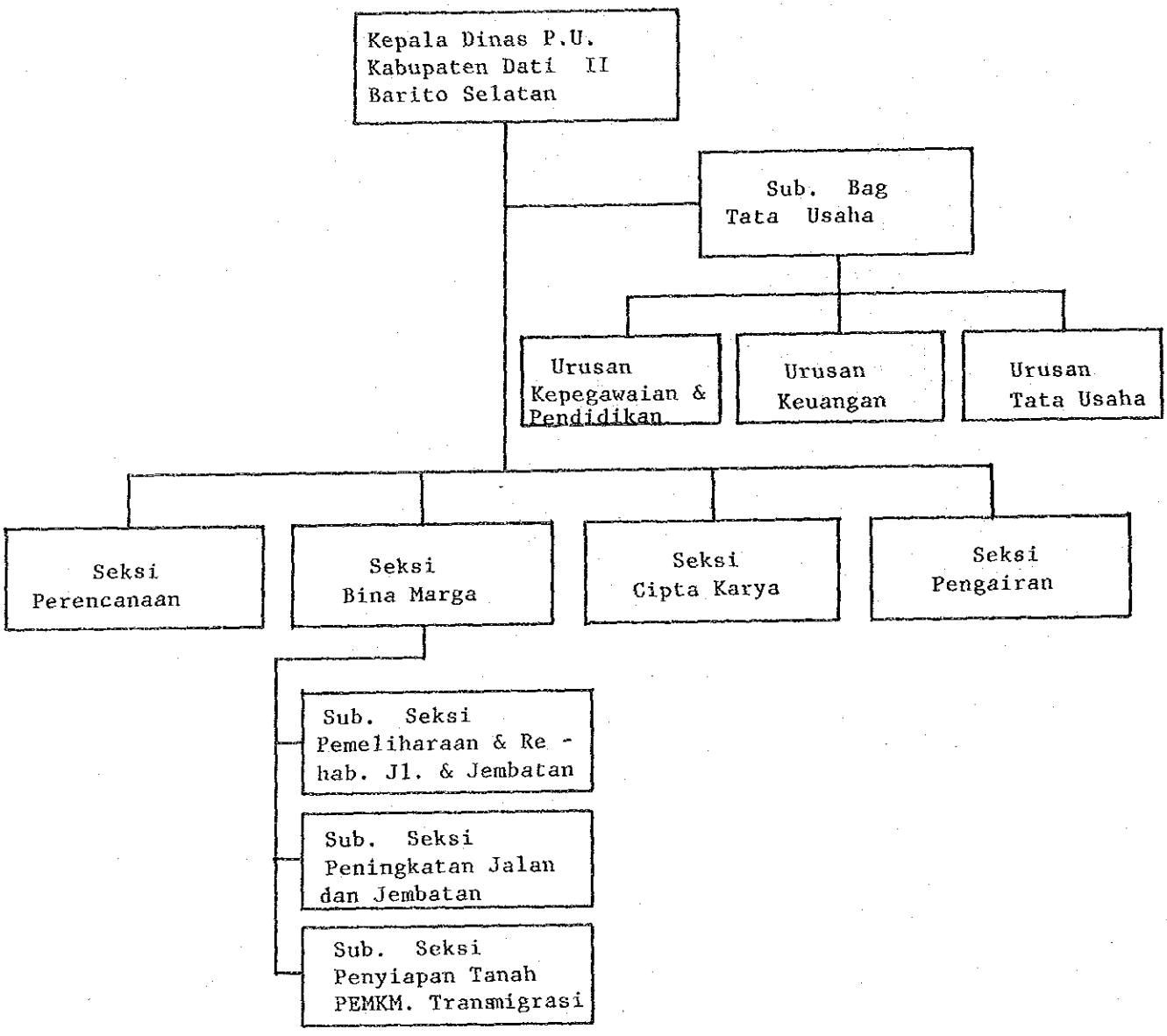
KABUPATEN: Barito Selatan

EXISTING ORGANIZATION IN KABUPATEN

Structur Organisasi yang ada dari P.U Kabupaten

Please draw the Cart of the Existing Organization in the Kabupaten.

Harap digambar bagan organisasi dari DPUK.



EXISTING STAFF RESOURCES OF BINA MARGA OF PU KABUPATEN

Tenaga Dinas PUK yang ada

PROPINSI: Kalimantan Tengah

KABUPATEN: Barito Selatan

(person)

DESCRIPTION /Uraian	NUMBER / Jumlah	REMARKS Keterangan
CONTROLING STAFF Staff teknis PUK	(12)	
DPUK ENGINEED Sarjana Teknik	-	
ASSISTANT ENGINEER Sarjana Muda Teknik	1	
TECHNICIAN STAFF Staff Teknik (STM)	11	
ADMINISTRATION Tenaga Administrasi	4	
SUPERVISOR Tenaga Pengawas	4	
WORKING FORCE Tenaga Pelaksana Lapangan	(26)	
OPERATORS Operators	3	
DRIVERS Supir	2	
MECHANICS Mechanic	1	
TRADESMAN Tukang	-	
L A B O U R Buruh / Pekerja	20	
OTHERS Lain-lain	-	
TOTAL / JUMLAH	46	

Catatan ; Untuk kolom keterangan harap diisi berapa orang yang telah mendapat Training.

E-06

LOCATION AND AREA OF DPUK WORKSHOP

Lokasi Workshop DPUK

PROPINSI : Kalimantan Tengah

KABUPATEN: Barito Selatan

LOCATION Lokasi	AREA (m2) Luas	NUMBER Jumlah	REMARKS Keterangan
Desa Sanggu	3 ha	1 bh	-
Kec. Dusun Selatan Bar-Sel	-	-	-

PROPINSI: Kalimantan Tengah

KABUPATEN: Barito Selatan

E-07

LAND ACQUISITION COST

Daftar harga pembebasan tanah

DESCRIPTION Uraian	UNIT Satuan	RATE (RP) Harga	REMARKS Keterangan
CITY/kota	1 M2	2,500	Masing-masing menurut-tanah
VILLAGE / desa	1 M2	1,000	"
RICE FIELD/sawah	1 M2	2,000	-
DRY FIELD/ladang	1 M2	500	-
MIX CROPS/panen	1 M2	2,000	-
FOREST/hutan	1 M2	200	-
SWAMP / rawa	1 M2	100	-
OTHERS / lain-lain	M2	-	-

PROPINSI: Kalimantan Tengah

E-08

KABUPATEN: Barito Selatan

Classification of local contractors at Kabupaten level.

Klasifikasi kontraktor di Kabupaten

COMPANY NAME Nama Kontraktor	CLASS Kelas	CAPITAL Modal (Rp)	NUMBER OF EMPLOYEE Jumlah pegawai	REMARKS Keterangan
69	C3	-	-	

NOTE: DATI II

PROPINSI: Kalimantan Tengah

KABUPATEN: Barito Selatan

E-09

LIST OF EXISTING EQUIPMENT OF LOCAL CONTRACTOR

Name of contractor

NAME OF EQUIPMENT Jenis peralatan	EXISTING CONDITION/ Kondisi Peralatan						REQUIRE - MENT / Kebutuhan peralatan baru
	TYPE/ Tipe	P.Y	NUMBER / Jumlah			REASON OF BAD CONDITION/Sebab Kerusakan	
			GOOD Baik	BAD Rusak	TOTAL Jumlah		
Bulldozer							
Motor Grader							
Tyre Roller							
Steel Whell Roller							
Vibration Roller							
Wheel Loader							
Front End Loader and Backhoe							
Mobile Crane							
Concrete Mixer							
Stone Crusher							
Portable Compressor							
Hydraulic Excavator							
Asphalt Paving Machine							
Asphalt Sprayer							
Asphalt Mixing Machine							
Mobile Workshop							
Mechanic Rammer							
Plate Tamper							
Pile Driver							
Leg Drill							
Hand Hammer							
Farm Tractor							
Dump Truck							
Water Tank Truck							
Fuel Tank Truck							
Pick Up							
Jeep							
Motorcycle							
Generator							
Water Pump							
Others							
-							

PROPINSI: Kalimantan Tengah

KABUPATEN: Barito Selatan

LIST OF EXISTING EQUIPMENT OF P.U KABUPATEN

NAME OF EQUIPMENT Jenis peralatan	EXISTING CONDITION/ Kondisi Peralatan						REQUIRE - MENT / Kebutuhan peralatan baru
	TYPE/ Tipe	P.Y	NUMBER / Jumlah			REASON OF BAD CONDITION/Sebab Kerusakan	
			GOOD Baik	BAD Rusak	TOTAL Jumlah		
Bulldozer							
Motor Grader							
Tyre Roller							
Steel Whell Roller			1	1	2		
Vibration Roller			2	1	3		
Wheel Loader							
Front End Loader and Backhoe							
Mobile Crane							
Concrete Mixer							
Stone Crusher			1	-	1		
Portable Compressor							
Hydraulic Excavator							
Asphalt Paving Machine							
Asphalt Sprayer			1	-	1		
Asphalt Mixing Machine							
Mobile Workshop							
Mechanic Rammer							
Plate Tamper							
Pile Driver							
Leg Drill							
Hand Hammer							
Farm Tractor							
Dump Truck							
Water Tank Truck							
Fuel Tank Truck							
Pick Up			1	-	1		
Jeep							
Motorcycle							
Generator							
Water Pump							
Others							

Appendix A-3 CONSTRUCTION AND MAINTENANCE COST FOR PROPOSED ROAD LINKS

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

LINK NO : 16 (IIIC) LENGTH : 18 Km

UPGRADE : 8.0m road bed, 4.0m road with surface Subbase Cource

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Site Clearance in Light Bush	m2	0.0	172	91	0	0	0
Subgrade Preparation	m2	144000.0	22	11	3,168,000	1,584,000	4,752,000
Normal Fill	m3	0.0	1,770	863	0	0	0
Fill in Swamp	m3	12168.8	8,165	267	99,358,252	3,249,069	102,607,321
Normal Excavation to Spoil	m3	2586.0	1,035	523	2,676,510	1,352,478	4,028,988
Cement Stabilizing	m3	11520.0	12,595	12,368	145,094,400	142,479,360	287,573,760
Cement Stabilizing	m3	0.0	12,595	12,368	0	0	0
Shoulder	m2	72000.0	313	146	22,536,000	10,512,000	33,048,000
Asphalt Patching	m2	0.0	8,785	1,983	0	0	0
Surface Dressing (Single)	m2	0.0	1,143	1,750	0	0	0
Surface Dressing (Double)	m2	0.0	1,618	2,764	0	0	0
Earth Drain	m	26520.0	1,158	119	30,710,160	3,155,880	33,866,040
Earth Drain in Swamp (by machine)	m3	66000.0	1,308	474	86,328,000	31,284,000	117,612,000
Pipe Culvert D80cm	m	38.0	67,003	49,971	2,546,114	1,898,898	4,445,012
Masonry Culvert (80x80cm)	m	0.0	112,944	39,061	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	10,646	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	3.2	84,329	10,457	269,852	33,462	303,314
Gabion Protection	m3	0.0	37,098	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	8,712,600	968,196	9,680,796
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		401,399,888	196,517,343	597,917,231
Overhead (15%)					60,209,983	29,477,601	89,687,584
			TOTAL COST		461,609,871	225,994,944	687,604,815
Manual routine maintenance of road	Km	18.0	193,016	7,248	3,474,288	130,464	3,604,752
Routine maintenance of gravel road	Km	18.0	789,730	42,664	14,215,140	767,952	14,983,092
			Sub Total		17,689,428	898,416	18,587,844
Maintenance of Timber Bridge (New)	m2	64.0	7,627	1,232	488,128	78,848	566,976
Maintenance of Concrete Bridge (New)	m2	0.0	2,841	3,061	0	0	0
Maintenance of Timber Bridge (Exist)	m2	393.0	7,676	2,459	3,016,668	966,387	3,983,055
Maintenance of Concrete Bridge (Exist)	m2	24.0	4,431	2,455	106,344	58,920	165,264

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	37,581,772
Timber Bridge	Unit Cost	(Rp/m2)	:	173,952
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	115,029,504
Maintenance Rate	without Bridge	(%)	:	2.75
New Bridge Cost Rate		(%)	:	1.62

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

LINK NO : 14 (IIIB-2) LENGTH : 4 Km

UPGRADE : 7.0m road bed, 4.0m road with surface Base Cource

(Rp)

ITEM	UNIT	QUANTITY	UNIT COST LOCAL	UNIT COST FOREIGN	COST LOCAL	COST FOREIGN	COST TOTAL
Site Clearance in Light Bush	m2	8000.0	172	91	1,376,000	728,000	2,104,000
Subgrade Preparation	m2	28000.0	22	11	616,000	308,000	924,000
Normal Fill	m3	0.0	1,770	863	0	0	0
Fill in Swamp	m3	5400.0	8,165	267	44,091,000	1,441,800	45,532,800
Normal Excavation to Spoil	m3	5211.0	1,035	523	5,393,385	2,725,353	8,118,738
Cement Stabilizing	m3	2240.0	12,595	12,368	28,212,800	27,704,320	55,917,120
Cement Stabilizing	m3	960.0	12,595	12,368	12,091,200	11,873,280	23,964,480
Shoulder	m2	12000.0	313	146	3,756,000	1,752,000	5,508,000
Asphalt Patching	m2	0.0	8,785	1,983	0	0	0
Surface Dressing (Single)	m2	0.0	1,143	1,750	0	0	0
Surface Dressing (Double)	m2	0.0	1,618	2,764	0	0	0
Earth Drain	m	2600.0	1,158	119	3,010,800	309,400	3,320,200
Earth Drain in Swamp (by machine)	m3	24000.0	1,308	474	31,392,000	11,376,000	42,768,000
Pipe Culvert D80cm	m	10.0	67,003	49,971	670,030	499,710	1,169,740
Masonry Culvert (80x80cm)	m	0.0	112,944	39,061	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	10,646	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	3.2	84,329	10,457	269,852	33,462	303,314
Gabion Protection	m3	0.0	37,098	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	0	0	0
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		130,879,067	58,751,325	189,630,392
Overhead (15%)					19,631,860	8,812,698	28,444,558
			TOTAL COST		150,510,927	67,564,023	218,074,950
Manual routine maintenance of road	Km	4.0	193,016	7,248	772,064	28,992	801,056
Routine maintenance of gravel road	Km	4.0	789,730	42,664	3,158,920	170,656	3,329,576
			Sub Total		3,930,984	199,648	4,130,632
Maintenance of Timber Bridge (New)	m2	0.0	7,627	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.0	2,841	3,061	0	0	0
Maintenance of Timber Bridge (Exist)	m2	75.0	7,676	2,459	575,700	184,425	760,125
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,431	2,455	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	54,518,738
Timber Bridge	Unit Cost	(Rp/m2)	:	
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	27,958,560
Maintenance Rate without Bridge		(%)	:	1.89
New Bridge Cost Rate		(%)	:	

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

LINK NO : 13 (IIIB-2) LENGTH : 7 Km

UPGRADE : 8.0m road bed, 4.0m road with surface Base Cource

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Site Clearance in Light Bush	m2	0.0	172	91	0	0	0
Subgrade Preparation	m2	11240.0	22	11	247,280	123,640	370,920
Normal Fill	m3	0.0	1,770	863	0	0	0
Fill in Swamp	m3	640.5	8,165	267	5,229,682	171,013	5,400,695
Normal Excavation to Spoil	m3	266.0	1,035	523	275,310	139,118	414,428
Cement Stabilizing	m3	1922.0	12,595	12,368	24,207,590	23,771,296	47,978,886
Cement Stabilizing	m3	1680.0	12,595	12,368	21,159,600	20,778,240	41,937,840
Shoulder	m2	28000.0	313	146	8,764,000	4,088,000	12,852,000
Asphalt Patching	m2	0.0	8,785	1,983	0	0	0
Surface Dressing (Single)	m2	0.0	1,143	1,750	0	0	0
Surface Dressing (Double)	m2	0.0	1,618	2,764	0	0	0
Earth Drain	m	0.0	1,158	119	0	0	0
Earth Drain in Swamp (by machine)	m3	2400.0	1,308	474	3,139,200	1,137,600	4,276,800
Pipe Culvert D80cm	m	6.0	67,003	49,971	402,018	299,826	701,844
Masonry Culvert (80x80cm)	m	0.0	112,944	39,061	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	10,646	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	0.0	84,329	10,457	0	0	0
Gabion Protection	m3	0.0	37,098	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	14,889,734	1,637,542	16,527,276
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		78,314,414	52,146,275	130,460,689
Overhead (15%)					11,747,162	7,821,941	19,569,103
			TOTAL COST		90,061,576	59,968,216	150,029,792
Manual routine maintenance of road	Km	7.0	193,016	7,248	1,351,112	50,736	1,401,848
Routine maintenance of gravel road	Km	7.0	789,730	42,664	5,528,110	298,648	5,826,758
			Sub Total		6,879,222	349,384	7,228,606
Maintenance of Timber Bridge (New)	m2	124.0	7,627	1,232	945,748	152,768	1,098,516
Maintenance of Concrete Bridge (New)	m2	0.0	2,941	3,061	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.0	7,676	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,431	2,455	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	18,717,632
Timber Bridge	Unit Cost	(Rp/m2)	:	153,277
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	23,989,443
Maintenance Rate without Bridge		(%)	:	5.52
New Bridge Cost Rate		(%)	:	12.67

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

LINK NO : 12 (IIIB-2) LENGTH : 14 Km

UPGRADE : 10.0m road bed, 4.0m road with surface Base Cource

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Site Clearance in Light Bush	m2	0.0	172	91	0	0	0
Subgrade Preparation	m2	2430.0	22	11	53,460	26,730	80,190
Normal Fill	m3	0.0	1,770	863	0	0	0
Fill in Swamp	m3	405.0	8,165	267	3,306,825	108,135	3,414,960
Normal Excavation to Spoil	m3	100.0	1,035	523	103,500	52,300	155,800
Cement Stabilizing	m3	2918.8	12,595	12,368	36,762,286	36,099,718	72,862,004
Cement Stabilizing	m3	3360.0	12,595	12,368	42,319,200	41,556,480	83,875,680
Shoulder	m2	84000.0	313	146	26,292,000	12,264,000	38,556,000
Asphalt Patching	m2	0.0	8,785	1,983	0	0	0
Surface Dressing (Single)	m2	0.0	1,143	1,750	0	0	0
Surface Dressing (Double)	m2	0.0	1,618	2,764	0	0	0
Earth Drain	m	27000.0	1,158	119	31,266,000	3,213,000	34,479,000
Earth Drain in Swamp (by machine)	m3	1800.0	1,308	474	2,354,400	853,200	3,207,600
Pipe Culvert D80cm	m	38.0	67,003	49,971	2,546,114	1,898,898	4,445,012
Masonry Culvert (80x80cm)	m	0.0	112,944	39,061	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	10,646	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	0.0	84,329	10,457	0	0	0
Gabion Protection	m3	0.0	37,098	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	3,333,392	384,818	3,718,210
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		148,337,177	96,457,279	244,794,456
Overhead (15%)					22,250,576	14,468,591	36,719,167
			TOTAL COST		170,587,753	110,925,870	281,513,623
Manual routine maintenance of road	Km	14.0	193,016	7,248	2,702,224	101,472	2,803,696
Routine maintenance of gravel road	Km	14.0	789,730	42,664	11,056,220	597,296	11,653,516
			Sub Total		13,758,444	698,768	14,457,212
Maintenance of Timber Bridge (New)	m2	20.0	7,627	1,232	152,540	24,640	177,180
Maintenance of Concrete Bridge (New)	m2	0.0	2,841	3,061	0	0	0
Maintenance of Timber Bridge (Exist)	m2	160.0	7,676	2,459	1,228,160	393,440	1,621,600
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,431	2,455	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	19,802,692
Timber Bridge	Unit Cost	(Rp/m2)	:	213,797
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	36,431,002
Maintenance Rate without Bridge		(%)	:	5.21
New Bridge Cost Rate		(%)	:	1.52

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

LINE NO : 8 (IIIB-2) LENGTH : 10 Km

UPGRADE : 10.0m road bed, 4.0m road with surface Base Cource

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Site Clearance in Light Bush	m2	0.0	172	91	0	0	0
Subgrade Preparation	m2	29720.0	22	11	653,840	326,920	980,760
Normal Fill	m3	0.0	1,770	863	0	0	0
Fill in Swamp	m3	1044.0	8,165	267	8,524,260	278,748	8,803,008
Normal Excavation to Spoil	m3	1548.0	1,035	523	1,602,180	809,604	2,411,784
Cement Stabilizing	m3	3363.6	12,595	12,368	42,364,542	41,601,004	83,965,546
Cement Stabilizing	m3	2400.0	12,595	12,368	30,228,000	29,683,200	59,911,200
Shoulder	m2	60000.0	313	146	18,780,000	8,760,000	27,540,000
Asphalt Patching	m2	0.0	8,785	1,983	0	0	0
Surface Dressing (Single)	m2	0.0	1,143	1,750	0	0	0
Surface Dressing (Double)	m2	0.0	1,618	2,764	0	0	0
Earth Drain	m	14860.0	1,158	119	17,207,880	1,768,340	18,976,220
Earth Drain in Swamp (by machine)	m3	7200.0	1,308	474	9,417,600	3,412,800	12,830,400
Pipe Culvert D80cm	m	29.0	67,003	49,971	1,943,087	1,449,159	3,392,246
Masonry Culvert (80x80cm)	m	0.0	112,944	39,061	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	10,646	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	6.4	84,329	10,457	539,705	66,924	606,629
Gabion Protection	m3	0.0	37,098	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	0	0	0
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		131,261,094	88,156,699	219,417,793
Overhead (15%)					19,689,164	13,223,504	32,912,668
			TOTAL COST		150,950,258	101,380,203	252,330,461
Manual routine maintenance of road	Km	10.0	193,016	7,248	1,930,160	72,480	2,002,640
Routine maintenance of gravel road	Km	10.0	789,730	42,664	7,897,300	426,640	8,323,940
			Sub Total		9,827,460	499,120	10,326,580
Maintenance of Timber Bridge (New)	m2	0.0	7,627	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.0	2,841	3,061	0	0	0
Maintenance of Timber Bridge (Exist)	m2	174.0	7,676	2,459	1,335,624	427,866	1,763,490
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,431	2,455	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	25,233,046
Timber Bridge	Unit Cost	(Rp/m2)	:	
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	41,982,773
Maintenance Rate without Bridge		(%)	:	4.09
New Bridge Cost Rate		(%)	:	

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

LINK NO : 1 (III1B-1) LENGTH : 9 Km

UPGRADE : 10.0m road bed, 4.0m road with surface Dressing (1)

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Site Clearance in Light Bush	m2	0.0	172	91	0	0	0
Subgrade Preparation	m2	80500.0	22	11	1,771,000	885,500	2,656,500
Normal Fill	m3	500.0	1,770	863	885,000	431,500	1,316,500
Fill in Swamp	m3	10800.0	8,165	267	88,182,000	2,883,600	91,065,600
Normal Excavation to Spoil	m3	3716.0	1,035	523	3,846,060	1,943,468	5,789,528
Cement Stabilizing	m3	6642.0	12,595	12,368	83,655,990	82,148,256	165,804,246
Cement Stabilizing	m3	2520.0	12,595	12,368	31,739,400	31,167,360	62,906,760
Shoulder	m2	54000.0	313	146	16,902,000	7,884,000	24,786,000
Asphalt Patching	m2	0.0	8,785	1,983	0	0	0
Surface Dressing (Single)	m2	36000.0	1,143	1,750	41,148,000	63,000,000	104,148,000
Surface Dressing (Double)	m2	0.0	1,618	2,764	0	0	0
Earth Drain	m	0.0	1,158	119	0	0	0
Earth Drain in Swamp (by machine)	m3	48000.0	1,308	474	62,784,000	22,752,000	85,536,000
Pipe Culvert D80cm	m	8.0	67,003	49,971	536,024	399,768	935,792
Masonry Culvert (80x80cm)	m	0.0	112,944	39,061	0	0	0
Retaining Wall and Wing Wall (Timber)	m2	0.0	10,646	246	0	0	0
Retaining Wall and Wing Wall (Masonry)	m3	0.0	84,329	10,457	0	0	0
Gabion Protection	m3	0.0	37,098	120	0	0	0
New Bridge (Timber)	SET	1.0	--	--	3,872,068	436,738	4,308,806
New Bridge (Concrete)	SET	1.0	--	--	0	0	0
			Sub Total		335,321,542	213,932,190	549,253,732
Overhead (15%)					50,298,231	32,089,828	82,388,059
			TOTAL COST		385,619,773	246,022,018	631,641,791
Manual routine maintenance of road	Km	9.0	193,016	7,248	1,737,144	65,232	1,802,376
Routine maintenance of asphalt road	Km	9.0	878,500	198,300	7,906,500	1,784,700	9,691,200
			Sub Total		9,643,644	1,849,932	11,493,576
Maintenance of Timber Bridge (New)	m2	24.0	7,627	1,232	183,048	29,568	212,616
Maintenance of Concrete Bridge (New)	m2	0.0	2,841	3,061	0	0	0
Maintenance of Timber Bridge (Exist)	m2	415.0	7,676	2,459	3,185,540	1,020,485	4,206,025
Maintenance of Concrete Bridge (Exist)	m2	0.0	4,431	2,455	0	0	0

Earthwork & Pavement	Unit Cost	(Rp/Km)	:	69,631,852
Timber Bridge	Unit Cost	(Rp/m2)	:	206,464
Concrete Bridge	Unit Cost	(Rp/m2)	:	
Survived Value		(Rp)	:	128,644,324
Maintenance Rate without Bridge		(%)	:	1.83
New Bridge Cost Rate		(%)	:	0.78

Appendix A-4 CONSTRUCTION AND MAINTENANCE QUANTITIES
FOR ALL PROPOSED ROAD LINKS
(CONSTRUCTION)

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

I T E M	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
EQUIPMENT :							
Bulldozer	hr	288.1	447.6	669.9	570.5	0.0	1976.1
Bulldozer/Ripper	hr	288.7	315.6	599.3	489.3	0.0	1692.9
Swamp Bulldozer	hr	34.8	337.6	279.1	363.6	0.0	1015.1
Motor Grader	hr	769.3	1055.7	1738.1	1320.7	0.0	4883.8
Road Stabilizer	hr	288.1	447.6	669.9	570.5	0.0	1976.1
Hand-guide Vib. Roller	hr	31.3	69.1	131.9	207.8	0.0	440.1
Tire Roller	hr	0.0	180.0	120.0	0.0	0.0	300.0
Vibratory Roller (D&T)	hr	677.1	1226.8	1713.0	1473.9	0.0	5090.8
Hydraulic Excavator; Wheel	hr	540.0	3645.0	3060.0	3960.0	0.0	11205.0
Wheel Loader	hr	720.9	978.0	1598.2	1345.0	0.0	4642.1
Water Tank Truck	hr	475.2	947.1	1233.7	1146.4	0.0	3802.4
Dump Truck	hr	5714.5	9514.5	14630.2	11983.4	0.0	41842.6
Flat Bed Truck with Crane	hr	27.2	57.1	107.5	195.7	0.0	387.5
Flat Bed Truck	hr	443.3	911.1	1195.7	926.0	0.0	3476.1
Concrete Mixer	hr	8.7	3.2	9.5	7.9	0.0	29.3
Water Pump	hr	7.4	3.0	9.3	7.0	0.0	26.7
Concrete Vibrator	hr	4.9	2.7	9.0	5.3	0.0	21.9
Asphalt Sprayer	hr	0.0	180.0	120.0	0.0	0.0	300.0
LABOUR :							
Mandur	man day	597.9	1254.6	1811.0	1646.6	0.0	5310.1
Skilled Labourer	man day	20.0	508.5	687.2	1516.8	0.0	2732.5
Carpenter	man day	1.6	209.7	312.8	805.7	0.0	1329.8
Mason	man day	6.4	0.9	0.9	4.4	0.0	12.6
Labourer	man day	7241.3	11166.4	19974.6	14247.9	0.0	52630.2
Driver	man day	1142.1	1989.5	2994.7	2455.8	0.0	8582.1
Operator	man day	699.3	1555.5	1973.5	1842.0	0.0	6070.3
MATERIAL :							
Bitumen	l	0.0	36900.0	24600.0	0.0	0.0	61500.0
Asphalt Oil	l	0.0	7380.0	4920.0	0.0	0.0	12300.0
Kerosene	l	0.0	8820.0	5880.0	0.0	0.0	14700.0
Sand	m3	6872.3	19297.5	22067.5	22620.4	0.0	70857.7
Cement	bag	11169.8	17275.7	25926.0	22043.9	0.0	76415.4
River Stone	m3	6.4	0.9	0.9	4.4	0.0	12.6
Steel Moulds	set	29.0	16.2	52.6	31.2	0.0	129.0
Timber	m3	0.0	18.9	28.1	73.0	0.0	120.0
Paint	l	0.0	137.0	209.6	507.4	0.0	854.0
Reinforcing Steel	kg	925.1	516.7	1677.9	995.2	0.0	4114.9
Tying Wire	kg	8.4	4.6	15.2	9.0	0.0	37.2
BaseCourse Material	m3	0.0	0.0	0.0	0.0	0.0	0.0
Crushed Stone	m3	8.2	364.6	255.0	8.9	0.0	636.7

CONSTRUCTION AND MAINTENANCE QUANTITIES
FOR ALL PROPOSED ROAD LINKS
(MAINTENANCE)

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

ITEM	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
EQUIPMENT :							
Bulldozer	hr	0.0	0.0	0.0	0.0	0.0	0.0
Bulldozer/Ripper	hr	0.0	0.0	0.0	0.0	0.0	0.0
Swamp Bulldozer	hr	0.0	0.0	0.0	0.0	0.0	0.0
Motor Grader	hr	104.5	232.0	232.0	295.0	0.0	863.5
Road Stabilizer	hr	0.0	0.0	0.0	0.0	0.0	0.0
Hand-guide Vib. Roller	hr	0.0	0.0	0.0	135.0	0.0	135.0
Tire Roller	hr	104.5	232.0	232.0	295.0	0.0	863.5
Vibratory Roller (D&T)	hr	0.0	0.0	0.0	0.0	0.0	0.0
Hydraulic Excavator; Wheel	hr	0.0	0.0	0.0	0.0	0.0	0.0
Wheel Loader	hr	0.0	0.0	0.0	0.0	0.0	0.0
Water Tank Truck	hr	0.0	0.0	0.0	0.0	0.0	0.0
Dump Truck	hr	0.0	0.0	0.0	270.0	0.0	270.0
Flat Bed Truck with Crane	hr	444.2	988.8	988.8	1651.8	0.0	4073.6
Flat Bed Truck	hr	386.5	856.0	856.0	1195.0	0.0	3293.5
Concrete Mixer	hr	0.0	0.0	0.0	0.0	0.0	0.0
Water Pump	hr	0.0	0.0	0.0	0.0	0.0	0.0
Concrete Vibrator	hr	0.0	0.0	0.0	0.0	0.0	0.0
Asphalt Sprayer	hr	0.0	0.0	0.0	0.0	0.0	0.0
LABOUR :							
Handur	man day	128.1	284.1	284.1	456.7	0.0	1153.0
Skilled Labourer	man day	123.3	274.5	274.5	548.5	0.0	1220.8
Carpenter	man day	66.2	147.3	147.3	246.2	0.0	607.0
Mason	man day	0.0	0.0	0.0	0.0	0.0	0.0
Labourer	man day	1399.0	3097.8	3097.8	4967.3	0.0	12561.9
Driver	man day	159.4	354.2	354.2	597.7	0.0	1465.5
Operator	man day	34.8	77.3	77.3	98.3	0.0	287.7
HATERIAL :							
Bitumen	l	0.0	0.0	0.0	1215.0	0.0	1215.0
Asphalt Oil	l	0.0	0.0	0.0	0.0	0.0	0.0
Kerosene	l	0.0	0.0	0.0	135.0	0.0	135.0
Sand	m3	0.0	0.0	0.0	22.5	0.0	22.5
Cement	bag	0.0	0.0	0.0	0.0	0.0	0.0
River Stone	m3	0.0	0.0	0.0	0.0	0.0	0.0
Steel Moulds	set	0.0	0.0	0.0	0.0	0.0	0.0
Timber	m3	6.0	13.3	13.3	22.3	0.0	54.9
Paint	l	42.8	95.4	95.4	159.4	0.0	393.0
Reinforcing Steel	kg	0.0	0.0	0.0	0.0	0.0	0.0
Tying Wire	kg	0.0	0.0	0.0	0.0	0.0	0.0
BaseCourse Material	m3	472.5	1080.0	1080.0	1530.0	0.0	4162.5
Crushed Stone	m3	0.0	0.0	0.0	13.5	0.0	13.5

CONSTRUCTION AND MAINTENANCE QUANTITIES
FOR ALL PROPOSED ROAD LINKS
(TOTAL)

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

I T E M	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
EQUIPMENT :							
Bulldozer	hr	288.1	447.6	669.9	570.5	0.0	1976.1
Bulldozer/Ripper	hr	288.7	315.6	599.3	489.3	0.0	1692.9
Swamp Bulldozer	hr	34.8	337.6	279.1	363.6	0.0	1015.1
Motor Grader	hr	873.8	1287.7	1970.1	1615.7	0.0	5747.3
Road Stabilizer	hr	288.1	447.6	669.9	570.5	0.0	1976.1
Hand-guide Vib. Roller	hr	31.3	69.1	131.9	342.8	0.0	575.1
Tire Roller	hr	104.5	412.0	352.0	295.0	0.0	1163.5
Vibratory Roller (D&T)	hr	677.1	1226.8	1713.0	1473.9	0.0	5090.8
Hydraulic Excavator; Wheel	hr	540.0	3645.0	3060.0	3960.0	0.0	11205.0
Wheel Loader	hr	720.9	978.0	1598.2	1345.0	0.0	4642.1
Water Tank Truck	hr	475.2	947.1	1233.7	1146.4	0.0	3802.4
Dump Truck	hr	5714.5	9514.5	14630.2	12253.4	0.0	42112.6
Flat Bed Truck with Crane	hr	471.4	1045.9	1096.3	1847.5	0.0	4461.1
Flat Bed Truck	hr	829.8	1767.1	2051.7	2121.0	0.0	6769.6
Concrete Mixer	hr	8.7	3.2	9.5	7.9	0.0	29.3
Water Pump	hr	7.4	3.0	9.3	7.0	0.0	26.7
Concrete Vibrator	hr	4.9	2.7	9.0	5.3	0.0	21.9
Asphalt Sprayer	hr	0.0	180.0	120.0	0.0	0.0	300.0
LABOUR :							
Mandur	man day	726.0	1538.7	2095.1	2103.3	0.0	6463.1
Skilled Labourer	man day	143.3	783.0	961.7	2065.3	0.0	3953.3
Carpenter	man day	67.8	357.0	460.1	1051.9	0.0	1936.8
Mason	man day	6.4	0.9	0.9	4.4	0.0	12.6
Labourer	man day	8640.3	14264.2	23072.4	19215.2	0.0	65192.1
Driver	man day	1301.5	2343.7	3348.9	3053.5	0.0	10047.6
Operator	man day	734.1	1632.8	2050.8	1940.3	0.0	6358.0
MATERIAL :							
Bitumen	l	0.0	36900.0	24600.0	1215.0	0.0	62715.0
Asphalt Oil	l	0.0	7380.0	4920.0	0.0	0.0	12300.0
Kerosene	l	0.0	8820.0	5880.0	135.0	0.0	14835.0
Sand	m3	6872.3	19297.5	22067.5	22642.9	0.0	70880.2
Cement	bag	11169.8	17275.7	25926.0	22043.9	0.0	76415.4
River Stone	m3	6.4	0.9	0.9	4.4	0.0	12.6
Steel Moulds	set	29.0	16.2	52.6	31.2	0.0	129.0
Timber	m3	6.0	32.2	41.4	95.3	0.0	174.9
Paint	l	42.8	232.4	305.0	666.8	0.0	1247.0
Reinforcing Steel	kg	925.1	516.7	1677.9	995.2	0.0	4114.9
Tying Wire	kg	8.4	4.6	15.2	9.0	0.0	37.2
BaseCourse Material	m3	472.5	1080.0	1080.0	1530.0	0.0	4162.5
Crushed Stone	m3	8.2	364.6	255.0	22.4	0.0	650.2

Appendix A-5

CONSTRUCTION AND MAINTENANCE COSTS FOR ALL PROPOSED ROAD LINKS (CONSTRUCTION)

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(1000 Rp)

I T E M	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
EQUIPMENT :		82,207	169,388	224,733	204,421	0	680,749
Bulldozer	14701	4,235	6,580	9,848	8,386	0	29,049
Bulldozer/Ripper	16028	4,627	5,058	9,605	7,842	0	27,132
Swamp Bulldozer	11827	411	3,992	3,300	4,300	0	12,003
Motor Grader	13674	10,519	14,435	23,766	18,059	0	66,779
Road Stabilizer	12719	3,664	5,693	8,520	7,256	0	25,133
Hand-guide Vib. Roller	1571	49	108	207	326	0	690
Tire Roller	10989	0	1,978	1,318	0	0	3,296
Vibratory Roller (D&T)	6815	4,614	8,360	11,674	10,044	0	34,692
Hydraulic Excavator; Wheel	12868	6,948	46,903	39,376	50,957	0	144,184
Wheel Loader	16848	12,145	16,477	26,926	22,660	0	78,208
Water Tank Truck	4022	1,911	3,809	4,961	4,610	0	15,291
Dump Truck	5488	31,361	52,215	80,290	65,764	0	229,630
Flat Bed Truck with Crane	5106	138	291	548	999	0	1,976
Flat Bed Truck	3397	1,505	3,095	4,061	3,145	0	11,806
Concrete Mixer	8742	76	27	83	69	0	255
Water Pump	486	3	1	4	3	0	11
Concrete Vibrator	320	1	0	2	1	0	4
Asphalt Sprayer	2037	0	366	244	0	0	610
LABOUR :		28,265	49,315	81,082	66,537	0	225,199
Handur	4000	2,391	5,018	7,244	6,586	0	21,239
Skilled Labourer	3250	65	1,652	2,233	4,929	0	8,879
Carpenter	2500	4	524	782	2,014	0	3,324
Mason	3000	19	2	2	13	0	36
Labourer	2750	19,913	30,707	54,930	39,181	0	144,731
Driver	3000	3,426	5,968	8,984	7,367	0	25,745
Operator	3500	2,447	5,444	6,907	6,447	0	21,245
MATERIAL :		109,032	290,481	338,337	288,563	0	1,026,413
Bitumen	1000	0	36,900	24,600	0	0	61,500
Asphalt Oil	800	0	5,904	3,936	0	0	9,840
Kerosene	250	0	2,205	1,470	0	0	3,675
Sand	7500	51,542	144,731	165,506	169,653	0	531,432
Cement	5000	55,849	86,378	129,630	110,219	0	382,076
River Stone	30000	192	27	27	132	0	378
Steel Moulds	8500	246	137	447	265	0	1,095
Timber	75000	0	1,417	2,107	5,475	0	8,999
Paint	3000	0	411	628	1,522	0	2,561
Reinforcing Steel	1000	925	516	1,677	995	0	4,113
Tying Wire	1500	12	6	22	13	0	53
BaseCourse Material	30000	0	0	0	0	0	0
Crushed Stone	32500	266	11,849	8,287	289	0	20,691

CONSTRUCTION AND MAINTENANCE COSTS
FOR ALL PROPOSED ROAD LINKS
(MAINTENANCE)

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(1000 Rp)

I T E M	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
EQUIPMENT :		6,156	13,676	13,676	21,460	0	54,968
Bulldozer	14701	0	0	0	0	0	0
Bulldozer/Ripper	16028	0	0	0	0	0	0
Swamp Bulldozer	11827	0	0	0	0	0	0
Motor Grader	13674	1,428	3,172	3,172	4,033	0	11,805
Road Stabilizer	12719	0	0	0	0	0	0
Hand-guide Vib. Roller	1571	0	0	0	212	0	212
Tire Roller	10989	1,148	2,549	2,549	3,241	0	9,487
Vibratory Roller (D&T)	6815	0	0	0	0	0	0
Hydraulic Excavator; Wheel	12868	0	0	0	0	0	0
Wheel Loader	16848	0	0	0	0	0	0
Water Tank Truck	4022	0	0	0	0	0	0
Dump Truck	5488	0	0	0	1,481	0	1,481
Flat Bed Truck with Crane	5106	2,268	5,048	5,048	8,434	0	20,798
Flat Bed Truck	3397	1,312	2,907	2,907	4,059	0	11,185
Concrete Mixer	8742	0	0	0	0	0	0
Water Pump	486	0	0	0	0	0	0
Concrete Vibrator	320	0	0	0	0	0	0
Asphalt Sprayer	2037	0	0	0	0	0	0
LABOUR :		5,523	12,246	12,246	20,020	0	50,035
Handur	4000	512	1,136	1,136	1,826	0	4,610
Skilled Labourer	3250	400	892	892	1,782	0	3,966
Carpenter	2500	165	368	368	615	0	1,516
Mason	3000	0	0	0	0	0	0
Labourer	2750	3,847	8,518	8,518	13,660	0	34,543
Driver	3000	478	1,062	1,062	1,793	0	4,395
Operator	3500	121	270	270	344	0	1,005
MATERIAL :		14,753	33,683	33,683	49,904	0	132,023
Bituaen	1000	0	0	0	1,215	0	1,215
Asphalt Oil	800	0	0	0	0	0	0
Kerosene	250	0	0	0	33	0	33
Sand	7500	0	0	0	168	0	168
Cement	5000	0	0	0	0	0	0
River Stone	30000	0	0	0	0	0	0
Steel Moulds	8500	0	0	0	0	0	0
Timber	75000	450	997	997	1,672	0	4,116
Paint	3000	128	286	286	478	0	1,178
Reinforcing Steel	1000	0	0	0	0	0	0
Tying Wire	1500	0	0	0	0	0	0
BaseCourse Material	30000	14,175	32,400	32,400	45,900	0	124,875
Crushed Stone	32500	0	0	0	438	0	438

CONSTRUCTION AND MAINTENANCE COSTS
FOR ALL PROPOSED ROAD LINKS
(TOTAL)

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

(1000 Rp)

I T E M	UNIT	(1988)	(1989)	(1990)	(1991)	(1992)	(TOTAL)
EQUIPMENT :		88,363	183,064	238,409	225,881	0	735,717
Bulldozer	14701	4,235	6,580	9,848	8,386	0	29,049
Bulldozer/Ripper	16028	4,627	5,058	9,605	7,842	0	27,132
Swamp Bulldozer	11827	411	3,992	3,300	4,300	0	12,003
Motor Grader	13674	11,947	17,607	26,938	22,092	0	78,584
Road Stabilizer	12719	3,664	5,693	8,520	7,256	0	25,133
Hand-guide Vib. Roller	1571	49	108	207	538	0	902
Tire Roller	10989	1,148	4,527	3,867	3,241	0	12,783
Vibratory Roller (D&T)	6815	4,614	8,360	11,674	10,044	0	34,692
Hydraulic Excavator; Wheel	12868	6,948	46,903	39,376	50,957	0	144,184
Wheel Loader	16848	12,145	16,477	26,926	22,660	0	78,208
Water Tank Truck	4022	1,911	3,809	4,961	4,610	0	15,291
Dump Truck	5488	31,361	52,215	80,290	67,245	0	231,111
Flat Bed Truck with Crane	5106	2,406	5,339	5,596	9,433	0	22,774
Flat Bed Truck	3397	2,817	6,002	6,968	7,204	0	22,991
Concrete Mixer	8742	76	27	83	69	0	255
Water Pump	486	3	1	4	3	0	11
Concrete Vibrator	320	1	0	2	1	0	4
Asphalt Sprayer	2037	0	366	244	0	0	610
LABOUR :		33,788	61,561	93,328	86,557	0	275,234
Mandur	4000	2,903	6,154	8,380	8,412	0	25,849
Skilled Labourer	3250	465	2,544	3,125	6,711	0	12,845
Carpenter	2500	169	892	1,150	2,629	0	4,840
Mason	3000	19	2	2	13	0	36
Labourer	2750	23,760	39,225	63,448	52,841	0	179,274
Driver	3000	3,904	7,030	10,046	9,160	0	30,140
Operator	3500	2,568	5,714	7,177	6,791	0	22,250
MATERIAL :		123,785	324,164	372,020	338,467	0	1,158,436
Bitumen	1000	0	36,900	24,600	1,215	0	62,715
Asphalt Oil	800	0	5,904	3,936	0	0	9,840
Kerosene	250	0	2,205	1,470	33	0	3,708
Sand	7500	51,542	144,731	165,506	169,821	0	531,600
Cement	5000	55,849	86,378	129,630	110,219	0	382,076
River Stone	30000	192	27	27	132	0	378
Steel Moulds	8500	246	137	447	265	0	1,095
Timber	75000	450	2,414	3,104	7,147	0	13,115
Paint	3000	128	697	914	2,000	0	3,739
Reinforcing Steel	1000	925	516	1,677	995	0	4,113
Tying Wire	1500	12	6	22	13	0	53
BaseCourse Material	30000	14,175	32,400	32,400	45,900	0	124,875
Crushed Stone	32500	266	11,849	8,287	727	0	21,129

Appendix A-6 QUANTITIES OF BRIDGE ON PROPOSED ROAD LINKS

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

LINK NO	BRIDGE NAME	Km	From	<< TYPE >> (EXIST)	(NEW)	DESIGN LOAD	SPAN CLASS	LENGTH (m)	SPAN NO (no)	SPAN LENGTH (m)	WIDTH (m)	AREA (EXIST) (m2)	AREA (NEW) (m2)	PIER (no)	ABUT (no)	ROAD CLASS
1	N.I	3	JLPT	--	TM	10T	(C)	6.00	1	6.00	4.00	0.00	24.00	0	2	IIIB-1
	PAKU	3	JLPT	KK				45.00	6	7.50	6.00	270.00		5	2	
	TABUK	5	JLPT	KK				8.00	2	4.00	5.00	40.00		1	2	
	SWALANG	8	JLPT	KK				15.00	3	5.00	5.00	75.00		2	2	
	LANBI	9	JLPT	KK				6.00	1	6.00	5.00	30.00		0	2	
8	PAPUN	0	SGDI	KK				6.00	1	6.00	5.00	30.00		0	2	IIIB-2
	SINGKARAN	2	SGDI	KK				11.00	3	3.67	4.00	44.00		2	2	
	UBAR	2	SGDI	KK				6.00	1	6.00	5.00	30.00		0	2	
	SALAI RIWUAT	3	SGDI	KK				6.00	1	6.00	5.00	30.00		0	2	
	MAKAI	7	SGDI	KK				5.00	1	5.00	4.00	20.00		0	2	
	KALIT	8	SGDI	KK				5.00	1	5.00	4.00	20.00		0	2	
12	TEWAH	1	TWPP	KK				40.00	7	5.71	4.00	160.00		6	2	IIIB-2
	BUNBAN	7	TWPP	--	TM	10T	(B)	5.00	1	5.00	4.00	0.00	20.00	0	2	
13	N.I	1	PLPD	--	TM	10T	(C)	6.00	1	6.00	4.00	0.00	24.00	0	2	IIIB-2
	RENGTENG	4	PLPD	--	TM	10T	(B)	10.00	2	5.00	4.00	0.00	40.00	1	2	
	TAKARU	4	PLPD	--	TM	10T	(C)	15.00	2	7.50	4.00	0.00	60.00	1	2	
14	PATANGKEP	2	BNTT	KK				15.00	3	5.00	5.00	75.00		2	2	IIIB-2
16	PATUNG	0	PATG	KK				5.00	1	5.00	4.00	20.00		0	2	IIIC
	TABILAS	2	PATG	KK				6.00	1	6.00	4.00	24.00		0	2	
	TURANANGSANG	3	PATG	--	TM	10T	(C)	8.00	1	8.00	4.00	0.00	32.00	0	2	
	MANPANE	3	PATG	KB				6.00	1	6.00	4.00	24.00		0	2	
	N.I	4	PATG	--	TM	10T	(C)	8.00	1	8.00	4.00	0.00	32.00	0	2	
	PANGKAN	4	PATG	KK				6.00	1	6.00	4.00	24.00		0	2	
	BALAGAR	7	PATG	KK				6.00	1	6.00	5.00	30.00		0	2	
	PANYUMPIT	8	PATG	KK				8.00	2	4.00	5.00	40.00		1	2	
	KIKIS	13	PATG	KK				15.00	3	5.00	5.00	75.00		2	2	
	PAKU	14	PATG	KK				18.00	3	6.00	5.00	90.00		2	2	
	BIWAN	17	PATG	KK				6.00	1	6.00	5.00	30.00		0	2	
	RANGUN	19	PATG	KK				6.00	1	6.00	5.00	30.00		0	2	
	ANPARI	19	PATG	KK				6.00	1	6.00	5.00	30.00		0	2	

Appendix A-7 CONSTRUCTION AND MAINTENANCE COST OF BRIDGES ON PROPOSAL ROAD LINKS

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

LINK NO : 1 (IIIB-1) LENGTH : 9 Km

(Rp)

ITEM	UNIT	QUANTITY	UNIT COST LOCAL	UNIT COST FOREIGN	COST LOCAL	COST FOREIGN	TOTAL
Superstructure (Timber;Span 3m;10T)	m2	0.00	41,260	4,083	0	0	0
Superstructure (Timber;Span 5m;10T)	m2	0.00	45,701	4,508	0	0	0
Superstructure (Timber;Span 8m;10T)	m2	24.00	60,529	5,920	1,452,696	142,080	1,594,776
Superstructure (Timber;Span 3m;BM50)	m2	0.00	51,160	5,048	0	0	0
Superstructure (Timber;Span 5m;BM50)	m2	0.00	55,849	5,469	0	0	0
Superstructure (Timber;Span 8m;BM50)	m2	0.00	70,831	6,922	0	0	0
Superstructure (Concrete;Span 3m;BM50)	m2	0.00	66,116	106,749	0	0	0
Superstructure (Concrete;Span 5m;BM50)	m2	0.00	69,177	119,370	0	0	0
Superstructure (Concrete;Span 8m;BM50)	m2	0.00	72,228	130,068	0	0	0
Superstructure (Concrete;Span10m;BM50)	m2	0.00	79,561	147,794	0	0	0
Superstructure (Concrete;Span15m;BM50)	m2	0.00	87,736	174,184	0	0	0
Substructure (Pier;for Timber;10T)	NO	0.00	359,571	37,984	0	0	0
Substructure (Abut;for Timber;10T)	NO	2.00	1,209,686	147,329	2,419,372	294,658	2,714,030
Substructure (Pier;for Timber;BM50)	NO	0.00	528,848	56,225	0	0	0
Substructure (Abut;for Timber;BM50)	NO	0.00	1,337,798	167,422	0	0	0
Substructure (Pier;for Concrete;BM50)	NO	0.00	3,093,327	477,264	0	0	0
Substructure (Abut;for Concrete;BM50)	NO	0.00	6,531,735	920,351	0	0	0
Demolition of Bridge (Timber->Timber)	m2	0.00	12,676	1,417	0	0	0
Demolition of Bridge (Timber->Concrete)	m2	0.00	12,676	1,417	0	0	0
Demolition of Bridge (Concrete)	m2	0.00	138,113	79,667	0	0	0
Maintenance of Timber Bridge (New)	m2	24.00	7,627	1,232	183,048	29,568	212,616
Maintenance of Concrete Bridge (New)	m2	0.00	2,841	3,061	0	0	0
Maintenance of Timber Bridge (Exist)	m2	415.00	7,676	2,459	3,185,540	1,020,485	4,206,025
Maintenance of Concrete Bridge (Exist)	m2	0.00	4,431	2,455	0	0	0
(Without Overhead)	TOTAL COST (Timber Bridge)				3,872,068	436,738	4,308,806
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				3,872,068	436,738	4,308,806
(Overhead : 15%)	TOTAL COST (Timber Bridge)				4,452,878	502,249	4,955,127
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				4,452,878	502,249	4,955,127

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

LINK NO : 8 (IIIB-2) LENGTH : 10 Km

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Superstructure (Timber;Span 3m;10T)	m2	0.00	41,260	4,083	0	0	0
Superstructure (Timber;Span 5m;10T)	m2	0.00	45,701	4,508	0	0	0
Superstructure (Timber;Span 8m;10T)	m2	0.00	60,529	5,720	0	0	0
Superstructure (Timber;Span 3m;BM50)	m2	0.00	51,160	5,048	0	0	0
Superstructure (Timber;Span 5m;BM50)	m2	0.00	55,849	5,469	0	0	0
Superstructure (Timber;Span 8m;BM50)	m2	0.00	70,831	6,922	0	0	0
Superstructure (Concrete;Span 3m;BM50)	m2	0.00	66,116	106,749	0	0	0
Superstructure (Concrete;Span 5m;BM50)	m2	0.00	69,177	119,370	0	0	0
Superstructure (Concrete;Span 8m;BM50)	m2	0.00	72,228	130,068	0	0	0
Superstructure (Concrete;Span10m;BM50)	m2	0.00	79,561	147,794	0	0	0
Superstructure (Concrete;Span15m;BM50)	m2	0.00	87,736	174,184	0	0	0
Substructure (Pier;for Timber;10T)	NO	0.00	359,571	37,984	0	0	0
Substructure (Abut;for Timber;10T)	NO	0.00	1,209,686	147,329	0	0	0
Substructure (Pier;for Timber;BM50)	NO	0.00	528,848	56,225	0	0	0
Substructure (Abut;for Timber;BM50)	NO	0.00	1,337,798	167,422	0	0	0
Substructure (Pier;for Concrete;BM50)	NO	0.00	3,093,327	477,264	0	0	0
Substructure (Abut;for Concrete;BM50)	NO	0.00	6,531,735	920,351	0	0	0
Demolition of Bridge (Timber->Timber)	m2	0.00	12,676	1,417	0	0	0
Demolition of Bridge (Timber->Concrete)	m2	0.00	12,676	1,417	0	0	0
Demolition of Bridge (Concrete)	m2	0.00	138,113	79,667	0	0	0
Maintenance of Timber Bridge (New)	m2	0.00	7,627	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.00	2,841	3,061	0	0	0
Maintenance of Timber Bridge (Exist)	m2	174.00	7,676	2,459	1,335,624	427,866	1,763,490
Maintenance of Concrete Bridge (Exist)	m2	0.00	4,431	2,455	0	0	0
(Without Overhead)	TOTAL COST (Timber Bridge)				0	0	0
	(Concrete Bridge)				0	0	0
	TOTAL COST (Without Maintenance)				0	0	0
(Overhead : 15%)	TOTAL COST (Timber Bridge)				0	0	0
	(Concrete Bridge)				0	0	0
	TOTAL COST (Without Maintenance)				0	0	0

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

LINK NO : 12 (IIIB-2) LENGTH : 14 Km

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Superstructure (Timber;Span 3m;10t)	m2	0.00	41,260	4,083	0	0	0
Superstructure (Timber;Span 5m;10t)	m2	20.00	45,701	4,508	914,020	90,160	1,004,180
Superstructure (Timber;Span 8m;10t)	m2	0.00	60,529	5,920	0	0	0
Superstructure (Timber;Span 3m;BM50)	m2	0.00	51,160	5,048	0	0	0
Superstructure (Timber;Span 5m;BM50)	m2	0.00	55,849	5,469	0	0	0
Superstructure (Timber;Span 8m;BM50)	m2	0.00	70,831	6,922	0	0	0
Superstructure (Concrete;Span 3m;BM50)	m2	0.00	66,116	106,749	0	0	0
Superstructure (Concrete;Span 5m;BM50)	m2	0.00	69,177	119,370	0	0	0
Superstructure (Concrete;Span 8m;BM50)	m2	0.00	72,220	130,068	0	0	0
Superstructure (Concrete;Span10m;BM50)	m2	0.00	79,561	147,794	0	0	0
Superstructure (Concrete;Span15m;BM50)	m2	0.00	87,736	174,184	0	0	0
Substructure (Pier;for Timber;10t)	NO	0.00	359,571	37,984	0	0	0
Substructure (Abut;for Timber;10t)	NO	2.00	1,209,686	147,329	2,419,372	294,658	2,714,030
Substructure (Pier;for Timber;BM50)	NO	0.00	528,848	56,225	0	0	0
Substructure (Abut;for Timber;BM50)	NO	0.00	1,337,798	167,422	0	0	0
Substructure (Pier;for Concrete;BM50)	NO	0.00	3,093,327	477,264	0	0	0
Substructure (Abut;for Concrete;BM50)	NO	0.00	6,531,735	920,351	0	0	0
Demolition of Bridge (Timber->Timber)	m2	0.00	12,676	1,417	0	0	0
Demolition of Bridge (Timber->Concrete)	m2	0.00	12,676	1,417	0	0	0
Demolition of Bridge (Concrete)	m2	0.00	138,113	79,667	0	0	0
Maintenance of Timber Bridge (New)	m2	20.00	7,627	1,232	152,540	24,640	177,180
Maintenance of Concrete Bridge (New)	m2	0.00	2,841	3,061	0	0	0
Maintenance of Timber Bridge (Exist)	m2	160.00	7,676	2,459	1,228,160	393,440	1,621,600
Maintenance of Concrete Bridge (Exist)	m2	0.00	4,431	2,455	0	0	0
(Without Overhead)	TOTAL COST (Timber Bridge)				3,333,392	384,818	3,718,210
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				3,333,392	384,818	3,718,210
(Overhead : 15%)	TOTAL COST (Timber Bridge)				3,833,401	442,541	4,275,942
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				3,833,401	442,541	4,275,942

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

LINK NO : 13 (IIIB-2) LENGTH : 7 Km

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Superstructure (Timber;Span 3m;10T)	m2	0.00	41,260	4,083	0	0	0
Superstructure (Timber;Span 5m;10T)	m2	40.00	45,701	4,508	1,828,040	180,320	2,008,360
Superstructure (Timber;Span 8m;10T)	m2	84.00	60,529	5,920	5,084,436	497,280	5,581,716
Superstructure (Timber;Span 3m;BM50)	m2	0.00	51,160	5,048	0	0	0
Superstructure (Timber;Span 5m;BM50)	m2	0.00	55,849	5,469	0	0	0
Superstructure (Timber;Span 8m;BM50)	m2	0.00	70,831	6,922	0	0	0
Superstructure (Concrete;Span 3m;BM50)	m2	0.00	66,116	106,749	0	0	0
Superstructure (Concrete;Span 5m;BM50)	m2	0.00	69,177	119,370	0	0	0
Superstructure (Concrete;Span 8m;BM50)	m2	0.00	72,228	130,068	0	0	0
Superstructure (Concrete;Span10m;BM50)	m2	0.00	79,561	147,794	0	0	0
Superstructure (Concrete;Span15m;BM50)	m2	0.00	87,736	174,184	0	0	0
Substructure (Pier;for Timber;10T)	NO	2.00	359,571	37,984	719,142	75,968	795,110
Substructure (Abut;for Timber;10T)	NO	6.00	1,209,686	147,329	7,258,116	883,974	8,142,090
Substructure (Pier;for Timber;BM50)	NO	0.00	528,848	56,225	0	0	0
Substructure (Abut;for Timber;BM50)	NO	0.00	1,337,798	167,422	0	0	0
Substructure (Pier;for Concrete;BM50)	NO	0.00	3,093,327	477,264	0	0	0
Substructure (Abut;for Concrete;BM50)	NO	0.00	6,531,735	920,351	0	0	0
Demolition of Bridge (Timber->Timber)	m2	0.00	12,676	1,417	0	0	0
Demolition of Bridge (Timber->Concrete)	m2	0.00	12,676	1,417	0	0	0
Demolition of Bridge (Concrete)	m2	0.00	138,113	79,667	0	0	0
Maintenance of Timber Bridge (New)	m2	124.00	7,627	1,232	945,748	152,768	1,098,516
Maintenance of Concrete Bridge (New)	m2	0.00	2,841	3,061	0	0	0
Maintenance of Timber Bridge (Exist)	m2	0.00	7,676	2,459	0	0	0
Maintenance of Concrete Bridge (Exist)	m2	0.00	4,431	2,455	0	0	0
(Without Overhead)	TOTAL COST (Timber Bridge)				14,889,734	1,637,542	16,527,276
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				14,889,734	1,637,542	16,527,276
(Overhead : 15%)	TOTAL COST (Timber Bridge)				17,123,194	1,883,173	19,006,367
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				17,123,194	1,883,173	19,006,367

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

LINK NO : 14 (IIIB-2) LENGTH : 4 Km

(Rp)

ITEM	UNIT	QUANTITY	UNIT COST LOCAL	UNIT COST FOREIGN	COST LOCAL	COST FOREIGN	TOTAL
Superstructure (Timber;Span 3m;10T)	m2	0.00	41,260	4,083	0	0	0
Superstructure (Timber;Span 5m;10T)	m2	0.00	45,701	4,508	0	0	0
Superstructure (Timber;Span 8m;10T)	m2	0.00	60,529	5,920	0	0	0
Superstructure (Timber;Span 3m;BM50)	m2	0.00	51,160	5,048	0	0	0
Superstructure (Timber;Span 5m;BM50)	m2	0.00	55,849	5,469	0	0	0
Superstructure (Timber;Span 8m;BM50)	m2	0.00	70,831	6,922	0	0	0
Superstructure (Concrete;Span 3m;BM50)	m2	0.00	66,116	106,749	0	0	0
Superstructure (Concrete;Span 5m;BM50)	m2	0.00	69,177	119,370	0	0	0
Superstructure (Concrete;Span 8m;BM50)	m2	0.00	72,228	130,068	0	0	0
Superstructure (Concrete;Span10m;BM50)	m2	0.00	79,561	147,794	0	0	0
Superstructure (Concrete;Span15m;BM50)	m2	0.00	87,736	174,184	0	0	0
Substructure (Pier;for Timber;10T)	NO	0.00	359,571	37,984	0	0	0
Substructure (Abut;for Timber;10T)	NO	0.00	1,209,686	147,329	0	0	0
Substructure (Pier;for Timber;BM50)	NO	0.00	528,848	56,225	0	0	0
Substructure (Abut;for Timber;BM50)	NO	0.00	1,337,798	167,422	0	0	0
Substructure (Pier;for Concrete;BM50)	NO	0.00	3,093,327	477,264	0	0	0
Substructure (Abut;for Concrete;BM50)	NO	0.00	6,531,735	920,351	0	0	0
Demolition of Bridge (Timber->Timber)	m2	0.00	12,676	1,417	0	0	0
Demolition of Bridge (Timber->Concrete)	m2	0.00	12,676	1,417	0	0	0
Demolition of Bridge (Concrete)	m2	0.00	138,113	79,667	0	0	0
Maintenance of Timber Bridge (New)	m2	0.00	7,627	1,232	0	0	0
Maintenance of Concrete Bridge (New)	m2	0.00	2,841	3,061	0	0	0
Maintenance of Timber Bridge (Exist)	m2	75.00	7,676	2,459	575,700	184,425	760,125
Maintenance of Concrete Bridge (Exist)	m2	0.00	4,431	2,455	0	0	0
(Without Overhead)	TOTAL COST (Timber Bridge)				0	0	0
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				0	0	0
(Overhead : 15%)	TOTAL COST (Timber Bridge)				0	0	0
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				0	0	0

PROV : KALIMANTAN TENGAH KAB : BARITO SELATAN

LINK NO : 16 (IIIC) LENGTH : 18 Km

(Rp)

ITEM	UNIT	QUANTITY	<<< UNIT COST >>> LOCAL	FOREIGN	<<<<<< COST LOCAL	FOREIGN	>>>>>> TOTAL
Superstructure (Timber;Span 3m;10T)	m2	0.00	41,260	4,083	0	0	0
Superstructure (Timber;Span 5m;10T)	m2	0.00	45,701	4,508	0	0	0
Superstructure (Timber;Span 8m;10T)	m2	64.00	60,529	5,920	3,873,856	378,880	4,252,736
Superstructure (Timber;Span 3m;BM50)	m2	0.00	51,160	5,048	0	0	0
Superstructure (Timber;Span 5m;BM50)	m2	0.00	55,849	5,469	0	0	0
Superstructure (Timber;Span 8m;BM50)	m2	0.00	70,831	6,922	0	0	0
Superstructure (Concrete;Span 3m;BM50)	m2	0.00	66,116	106,749	0	0	0
Superstructure (Concrete;Span 5m;BM50)	m2	0.00	69,177	119,370	0	0	0
Superstructure (Concrete;Span 8m;BM50)	m2	0.00	72,228	130,068	0	0	0
Superstructure (Concrete;Span10m;BM50)	m2	0.00	79,561	147,794	0	0	0
Superstructure (Concrete;Span15m;BM50)	m2	0.00	87,736	174,184	0	0	0
Substructure (Pier;for Timber;10T)	NO	0.00	359,571	37,984	0	0	0
Substructure (Abut;for Timber;10T)	NO	4.00	1,209,686	147,329	4,838,744	589,316	5,428,060
Substructure (Pier;for Timber;BM50)	NO	0.00	520,848	56,225	0	0	0
Substructure (Abut;for Timber;BM50)	NO	0.00	1,337,798	167,422	0	0	0
Substructure (Pier;for Concrete;BM50)	NO	0.00	3,093,327	477,264	0	0	0
Substructure (Abut;for Concrete;BM50)	NO	0.00	6,531,735	920,351	0	0	0
Desolition of Bridge (Timber->Timber)	m2	0.00	12,676	1,417	0	0	0
Desolition of Bridge (Timber->Concrete)	m2	0.00	12,676	1,417	0	0	0
Desolition of Bridge (Concrete)	m2	0.00	138,113	79,667	0	0	0
Maintenance of Timber Bridge (New)	m2	64.00	7,627	1,232	488,128	78,848	566,976
Maintenance of Concrete Bridge (New)	m2	0.00	2,881	3,061	0	0	0
Maintenance of Timber Bridge (Exist)	m2	393.00	7,676	2,459	3,016,668	966,387	3,983,055
Maintenance of Concrete Bridge (Exist)	m2	24.00	4,431	2,455	106,344	58,920	165,264
(Without Overhead)	TOTAL COST (Timber Bridge)				8,712,600	968,196	9,680,796
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				8,712,600	968,196	9,680,796
(Overhead : 15%)	TOTAL COST (Timber Bridge)				10,019,490	1,113,425	11,132,915
	(Concrete Bridge)				0	0	0
	TOTAL COST (without Maintenance)				10,019,490	1,113,425	11,132,915